

#4



SEQUENCE LISTING

<110> Kinnerseely, Alan M.

Turano, Frank J.

<120> Methods for Regulating Plant GABA Production

<130> 7224-65

<150> US 60/246,367

<151> 2000-11-07

<160> 24

<170> PatentIn version 3.1

<210> 1

<211> 1509

<212> DNA

<213> Arabidopsis thaliana

<220>

<221> CDS

<222> (1)..(1509)

<223>

<400> 1	
atg gtg ctc tcc cac gcc gta tcg gag tcg gac gtc tcc gtc cac tcc	48
Met Val Leu Ser His Ala Val Ser Glu Ser Asp Val Ser Val His Ser	
1 5 10 15	
aca ttc gca tca cgt tac gtc cgt act tca ctt cct agg ttc aag atg	96
Thr Phe Ala Ser Arg Tyr Val Arg Thr Ser Leu Pro Arg Phe Lys Met	
20 25 30	
ccg gaa aac tcg att cct aag gaa gcg gcg tat cag atc atc aac gac	144
Pro Glu Asn Ser Ile Pro Lys Glu Ala Ala Tyr Gln Ile Ile Asn Asp	
35 40 45	

gag ctg atg ctt gac ggg aat cca cgg ttg aac tta gcc tcc ttt gtg Glu Leu Met Leu Asp Gly Asn Pro Arg Leu Asn Leu Ala Ser Phe Val	192
50	
acg aca tgg atg gag cct gag tgt gat aaa ctc atc atg tcc tcc atc Thr Thr Trp Met Glu Pro Glu Cys Asp Lys Leu Ile Met Ser Ser Ile	240
65	80
aac aag aac tat gtt gac atg gac gag tac ccc gtc acc acc gaa ctt Asn Lys Asn Tyr Val Asp Met Asp Glu Tyr Pro Val Thr Thr Glu Leu	288
85	95
cag aac cga tgt gtg aac atg att gca cat cta ttc aat gca ccg tta Gln Asn Arg Cys Val Asn Met Ile Ala His Leu Phe Asn Ala Pro Leu	336
100	110
gaa gag gcg gag acc gcc gtc gga gta gga acc gtt gga tca tcg gag Glu Glu Glu Glu Thr Val Ala Val Val Gly Thr Val Gly Ser Ser Glu	384
115	125
gcc ata atg ttg gcc ggt ttg gcc ttc aag cgt aaa tgg cag aac aag Ala Ile Met Leu Ala Gly Leu Ala Phe Lys Arg Lys Trp Gln Asn Lys	432
130	140
cgc aaa gct gaa ggc aaa ccc gtc gat aaa ccc aac att gtc acc gga Arg Lys Ala Glu Gly Lys Pro Val Asp Lys Pro Asn Ile Val Thr Gly	480
145	160
gcc aat gtt caa gtg tgt tgg gag aaa ttc gct agg tac ttt gag gtt Ala Asn Val Gln Val Cys Trp Glu Lys Phe Ala Arg Tyr Phe Glu Val	528
165	175
gaa ctt aag gaa gtg aaa ttg agt gaa gga tac tat gtg atg gac cct Glu Leu Lys Glu Val Lys Leu Ser Glu Gly Tyr Tyr Val Met Asp Pro	576
180	190
caa caa gct gtt gat atg gtt gat gag aac acc att tgt gtt gcg gac Gln Gln Ala Val Asp Met Val Asp Glu Asn Thr Ile Cys Val Ala Asp	624
195	205
att ctt ggt tcc act ctt aat gga gaa ttc gaa gat gtt aaa ctc ttg Ile Leu Gly Ser Thr Leu Asn Gly Glu Phe Glu Asp Val Lys Leu Leu	672
210	220
aac gat ctc ttg gtc gaa aag aac aaa gaa acc gga tgg gat aca cca Asn Asp Leu Leu Val Glu Lys Asn Lys Glu Thr 235 Gly Trp Asp Thr Pro	720
225	240
atc cac gtg gat gcg gca agt gga gga ttc att gca ccg ttt ttg tat Ile His Val Asp Ala Ala Ser Gly Gly Phe Ile Ala Pro Phe Leu Tyr	768
245	255
ccg gaa ttg gaa tgg gac ttt aga ctt ccc ttg gtg aag agt atc aat Pro Glu Leu Glu Trp Asp Phe Arg Leu Pro Leu Val Lys Ser Ile Asn	816
260	270
gtg agt ggt cac aag tat gga ctt gtg tac gca ggg att ggt tgg gtg Val Ser Gly His Lys Tyr Gly Leu Val Tyr Ala Gly Ile Gly Trp Val	864
275	285
atc tgg aga aac aaa gag gat ttg cct gag gaa ctc atc ttc cat atc Ile Trp Arg Asn Lys Glu Asp Leu Pro Glu Glu Leu Ile Phe His Ile	912
290	300

aat tat ctt ggt gct gac caa ccc acc ttt act ctc aat ttc tcc aaa Asn Tyr Leu Gly Ala Asp Gln Pro Thr Phe Thr 315 Leu Asn Phe Ser Lys 320	960
ggt tca agt caa gtc att gct caa tac tac caa ctt atc cga ttg ggc Gly Ser Ser Gln 325 Ile Ala Gln Tyr 330 Gln Leu Ile Arg 335 Leu Gly	1008
cac gag ggt tac aga aat gtg atg gag aat tgc aga gag aat atg atc His Glu Gly Tyr Arg Asn Val Met 345 Asn Cys Arg Glu Asn 350 Met Ile	1056
gtc cta agg gaa gga ctt gag aag aca gaa agg ttc aac atc gtc tca Val Leu Arg 355 Glu Gly Leu Glu Lys 360 Thr Glu Arg Phe 365 Ile Val Ser	1104
aag gac gag gga gtg cca ctt gtc gct ttc tcc ttg aaa gat agc agc Lys Asp 370 Glu Gly Val Pro Leu 375 Val Ala Phe Ser 380 Lys Asp Ser Ser	1152
tgt cac act gag ttc gaa atc tcc gac atg ctt cgc agg tat gga tgg Cys His Thr Glu Phe 390 Ile Ser Asp Met 395 Leu Arg Arg Tyr Gly 400 Trp	1200
ata gtg ccg gcc tac aca atg cct cca aat gca caa cac atc act gtt Ile Val Pro Ala Tyr 405 Thr Met Pro Pro 410 Ala Gln His Ile Thr Val 415	1248
ctt cgt gtg gtt atc aga gaa gat ttc tcg aga aca ctc gct gag aga Leu Arg Val 420 Ile Arg Glu Asp 425 Phe Ser Arg Thr Leu Ala 430 Glu Arg	1296
ctt gtg atc gat ata gag aaa gtg atg cgt gag ctc gat gag ctt cct Leu Val 435 Ile Asp Ile Glu Lys 440 Val Met Arg Glu Leu Asp 445 Glu Leu Pro	1344
tcg aga gtg att cac aaa ata tca ctt gga caa gag aag agt gaa tct Ser Arg Val 450 Ile His Lys 455 Ser Leu Gly Gln 460 Glu Lys Ser Glu Ser	1392
aac agc gat aac ttg atg gtc acg gtg aag aag agc gat atc gac aag Asn Ser Asp Asn Leu Met 470 Thr Val Lys 475 Lys Ser Asp Ile Asp Lys 480	1440
cag aga gat atc atc act ggc tgg aag aag ttt gtc gcc gac agg aag Gln Arg Asp Ile 485 Thr Gly Trp Lys 490 Phe Val Ala Asp Arg Lys 495	1488
aag acg agt ggt atc tgc taa Lys Thr Ser Gly 500 Ile Cys	1509

<210> 2

<211> 502

<212> PRT

<213> Arabidopsis thaliana

<400> 2

Met Val Leu Ser His Ala Val Ser Glu Ser Asp Val Ser Val His Ser
1 5 10 15

Thr Phe Ala Ser Arg Tyr Val Arg Thr Ser Leu Pro Arg Phe Lys Met
20 25 30

Pro Glu Asn Ser Ile Pro Lys Glu Ala Ala Tyr Gln Ile Ile Asn Asp
35 40 45

Glu Leu Met Leu Asp Gly Asn Pro Arg Leu Asn Leu Ala Ser Phe Val
50 55 60

Thr Thr Trp Met Glu Pro Glu Cys Asp Lys Leu Ile Met Ser Ser Ile
65 70 75 80

Asn Lys Asn Tyr Val Asp Met Asp Glu Tyr Pro Val Thr Thr Glu Leu
85 90 95

Gln Asn Arg Cys Val Asn Met Ile Ala His Leu Phe Asn Ala Pro Leu
100 105 110

Glu Glu Ala Glu Thr Ala Val Gly Val Gly Thr Val Gly Ser Ser Glu
115 120 125

Ala Ile Met Leu Ala Gly Leu Ala Phe Lys Arg Lys Trp Gln Asn Lys
130 135 140

Arg Lys Ala Glu Gly Lys Pro Val Asp Lys Pro Asn Ile Val Thr Gly
145 150 155 160

Ala Asn Val Gln Val Cys Trp Glu Lys Phe Ala Arg Tyr Phe Glu Val
165 170 175

Glu Leu Lys Glu Val Lys Leu Ser Glu Gly Tyr Tyr Val Met Asp Pro
180 185 190

Gln Gln Ala Val Asp Met Val Asp Glu Asn Thr Ile Cys Val Ala Asp
195 200 205

Ile Leu Gly Ser Thr Leu Asn Gly Glu Phe Glu Asp Val Lys Leu Leu
210 215 220

Asn Asp Leu Leu Val Glu Lys Asn Lys Glu Thr Gly Trp Asp Thr Pro
225 230 235 240

Ile His Val Asp Ala Ala Ser Gly Gly Phe Ile Ala Pro Phe Leu Tyr
245 250 255

Pro Glu Leu Glu Trp Asp Phe Arg Leu Pro Leu Val Lys Ser Ile Asn
 260 265 270
 Val Ser Gly His Lys Tyr Gly Leu Val Tyr Ala Gly Ile Gly Trp Val
 275 280 285
 Ile Trp Arg Asn Lys Glu Asp Leu Pro Glu Glu Leu Ile Phe His Ile
 290 295 300
 Asn Tyr Leu Gly Ala Asp Gln Pro Thr Phe Thr Leu Asn Phe Ser Lys
 305 310 315 320
 Gly Ser Ser Gln Val Ile Ala Gln Tyr Tyr Gln Leu Ile Arg Leu Gly
 325 330 335
 His Glu Gly Tyr Arg Asn Val Met Glu Asn Cys Arg Glu Asn Met Ile
 340 345 350
 Val Leu Arg Glu Gly Leu Glu Lys Thr Glu Arg Phe Asn Ile Val Ser
 355 360 365
 Lys Asp Glu Gly Val Pro Leu Val Ala Phe Ser Leu Lys Asp Ser Ser
 370 375 380
 Cys His Thr Glu Phe Glu Ile Ser Asp Met Leu Arg Arg Tyr Gly Trp
 385 390 395 400
 Ile Val Pro Ala Tyr Thr Met Pro Pro Asn Ala Gln His Ile Thr Val
 405 410 415
 Leu Arg Val Val Ile Arg Glu Asp Phe Ser Arg Thr Leu Ala Glu Arg
 420 425 430
 Leu Val Ile Asp Ile Glu Lys Val Met Arg Glu Leu Asp Glu Leu Pro
 435 440 445
 Ser Arg Val Ile His Lys Ile Ser Leu Gly Gln Glu Lys Ser Glu Ser
 450 455 460
 Asn Ser Asp Asn Leu Met Val Thr Val Lys Lys Ser Asp Ile Asp Lys
 465 470 475 480
 Gln Arg Asp Ile Ile Thr Gly Trp Lys Lys Phe Val Ala Asp Arg Lys
 485 490 495
 Lys Thr Ser Gly Ile Cys
 500

<210> 3
 <211> 1665
 <212> DNA
 <213> Arabidopsis thaliana

<220>
 <221> CDS
 <222> (17)..(1498)
 <223>

<400> 3
 ctaaacagaa acaaaag atg gtt ttg aca aaa acc gca acg aat gat gaa tct 52
 Met Val Leu Thr Lys Thr Ala Thr Asn Asp Glu Ser
 1 5 10

gtc tgc acc atg ttc gga tct cgc tat gtt cgc act aca ctt ccc aag 100
 Val Cys Thr Met Phe Gly Ser Arg Tyr Val Arg Thr Leu Pro Lys
 15 20 25

tat gag att ggt gag aat tcg ata ccg aaa gac gct gca tat cag atc 148
 Tyr Glu Ile Gly Glu Asn Ser Ile Pro Lys Asp Ala Ala Tyr Gln Ile
 30 35 40

ata aaa gat gag ctg atg ctt gat ggt aac ccg agg ctt aac cta gct 196
 Ile Lys Asp Glu Leu Met Leu Asp Gly Asn Pro Arg Leu Asn Leu Ala
 45 50 55 60

tcg ttt gtg act aca tgg atg gaa cca gag tgt gac aaa ctc atc atg 244
 Ser Phe Val Thr Trp Met Glu Pro Glu Cys Asp Lys Leu Ile Met
 65 70 75

gac tct atc aac aag aac tac gtt gat atg gat gag tac cct gtc aca 292
 Asp Ser Ile Asn Lys Asn Tyr Val Val Asp Met Asp Glu Tyr Pro Val Thr
 80 85 90

act gag ctc cag aac cga tgt gta aac att ata gct cga ctg ttc aat 340
 Thr Glu Leu Gln Asn Arg Cys Glu Asn Ile Ile Ala Arg Leu Phe Asn
 95 100 105

gcg cca ctc gag gaa tct gag acg gcg gtg gga gta ggg aca gtt ggt 388
 Ala Pro Leu Glu Glu Ser Glu Thr Ala Val Gly Val Gly Thr Val Gly
 110 115 120

tct tca gaa gcc atc atg tta gcc gga ttg gcc ttc aaa aga aaa tgg 436
 Ser Ser Glu Ala Ile Met Leu Ala Gly Leu Ala Phe Lys Arg Lys Trp
 125 130 135 140

cag aac aaa cgc aag gct gag ggt aaa ccc tat gac aaa ccc aac att 484
 Gln Asn Lys Arg Lys Ala Glu Gly Lys Pro Tyr Asp Lys Pro Asn Ile
 145 150 155

gtc act gga gcc aat gtt caa gtt tgc tgg gag aaa ttc gct cgg tac 532
 Page 6

Val	Thr	Gly	Ala	Asn	Val	Gln	Val	Cys	Trp	Glu	Lys	Phe	Ala	Arg	Tyr		
			160					165					170				
ttc	gag	gtg	gag	cta	aag	gaa	gta	aac	cta	agt	gaa	ggt	tac	tac	gtg	580	
Phe	Glu	Val	Glu	Leu	Lys	Glu	Val	Asn	Leu	Ser	Glu	Gly	Tyr	Tyr	Val		
		175					180					185					
atg	gat	cca	gac	aaa	gca	gca	gaa	atg	gta	gac	gag	aac	aca	atc	tgt	628	
Met	Asp	Pro	Asp	Lys	Ala	Ala	Glu	Met	Val	Asp	Glu	Asn	Thr	Ile	Cys		
		190				195					200						
gtc	gca	gcc	ata	ttg	gga	tcc	aca	ctc	aac	ggt	gag	ttc	gaa	gac	gtg	676	
Val	Ala	Ala	Ile	Leu	Gly	Ser	Thr	Leu	Asn	Gly	Glu	Phe	Glu	Asp	Val		
		205			210					215					220		
aaa	cgt	ctc	aat	gac	ttg	cta	gtc	aag	aaa	aac	gag	gag	act	ggt	tgg	724	
Lys	Arg	Leu	Asn	Asp	Leu	Leu	Val	Lys	Lys	Asn	Glu	Glu	Thr	Gly	Trp		
				225					230					235			
aac	aca	ccg	atc	cac	gtg	gat	gca	gca	agt	gga	ggg	ttc	ata	gct	ccg	772	
Asn	Thr	Pro	Ile	His	Val	Asp	Ala	Ala	Ser	Gly	Gly	Phe	Ile	Ala	Pro		
			240					245					250				
ttt	atc	tat	cct	gaa	tta	gaa	tgg	gac	ttt	aga	ctt	cct	ttg	gtt	aag	820	
Phe	Ile	Tyr	Pro	Glu	Leu	Glu	Trp	Asp	Phe	Arg	Leu	Pro	Leu	Val	Lys		
		255					260					265					
agt	atc	aac	gtg	agt	ggt	cac	aag	tat	gga	ctg	gtc	tat	gct	ggt	att	868	
Ser	Ile	Asn	Val	Ser	Gly	His	Lys	Tyr	Gly	Leu	Val	Tyr	Ala	Gly	Ile		
		270				275					280						
ggt	tgg	gtc	gtg	tgg	agg	gca	gca	gag	gat	ttg	cct	gaa	gag	ctt	atc	916	
Gly	Trp	Val	Val	Trp	Arg	Ala	Ala	Glu	Asp	Leu	Pro	Glu	Glu	Leu	Ile		
		285			290					295					300		
ttt	cat	att	aat	tat	ctt	ggt	gct	gat	caa	ccc	act	ttc	act	ctc	aat	964	
Phe	His	Ile	Asn	Tyr	Leu	Gly	Ala	Asp	Gln	Pro	Thr	Phe	Thr	Leu	Asn		
				305					310					315			
ttc	tcc	aag	gga	tgc	agc	caa	att	att	gct	caa	tac	tac	cag	ctc	att	1012	
Phe	Ser	Lys	Gly	Ser	Ser	Gln	Ile	Ile	Ala	Gln	Tyr	Tyr	Gln	Leu	Ile		
			320					325					330				
cgt	ctt	gga	ttc	gag	ggg	tac	aaa	aat	gtg	atg	gag	aat	tgc	ata	gag	1060	
Arg	Leu	Gly	Phe	Glu	Gly	Tyr	Lys	Asn	Val	Met	Glu	Asn	Cys	Ile	Glu		
		335					340					345					
aac	atg	gtg	gtt	ctc	aaa	gaa	ggg	ata	gag	aaa	aca	gag	cgt	ttc	aac	1108	
Asn	Met	Val	Val	Leu	Lys	Glu	Gly	Ile	Glu	Lys	Thr	Glu	Arg	Phe	Asn		
		350				355					360						
ata	gtc	tca	aag	gac	caa	gga	gtg	cca	gtc	gta	gcc	ttc	tct	ctc	aag	1156	
Ile	Val	Ser	Lys	Asp	Gln	Gly	Val	Pro	Val	Val	Ala	Phe	Ser	Leu	Lys		
					370					375					380		
gac	cat	agt	ttc	cac	aac	gag	ttc	gag	atc	tct	gag	atg	cta	cgt	cgt	1204	
Asp	His	Ser	Phe	His	Asn	Glu	Phe	Glu	Ile	Ser	Glu	Met	Leu	Arg	Arg		
				385					390					395			
ttt	ggc	tgg	atc	gtc	cca	gct	tac	act	atg	cct	gcc	gat	gca	cag	cac	1252	
Phe	Gly	Trp	Ile	Val	Pro	Ala	Tyr	Thr	Met	Pro	Ala	Asp	Ala	Gln	His		
			400					405					410				
atc	acg	gtt	ctg	cgt	gtt	gtc	atc	agg	gaa	gat	ttc	tca	aga	aca	ctc	1300	

Ile Thr Val 415	Leu Arg Val Val 420	Ile Arg Glu Asp Phe Ser Arg Thr Leu 425	
gcg gag aga ctt gtt gct gat att tcg aag gtg ctt cat gag cta gat Ala Glu Arg Leu Val Ala Asp Ile Ser Lys Val Leu His Glu Leu Asp 430 435 440			1348
acc ttg cct tcc aag ata tct aag aag atg gga ata gaa ggg atc gcg Thr Leu Pro Ser Lys Ile Ser Lys Lys Met Gly Ile Glu Gly Ile Ala 445 450 455 460			1396
gaa aat gta aag gag aag aag atg gag aag gag att ctg atg gaa gtt Glu Asn Val Lys Glu Lys Lys Met Glu Lys Glu Ile Leu Met Glu Val 465 470 475			1444
att gtt gga tgg agg aag ttt gtg aag gag agg aag aag atg aat ggt Ile Val Gly Trp Arg Lys Phe Val Lys Glu Arg Lys Lys Met Asn Gly 480 485 490			1492
gtg tgc taagcaagtg tgttgcccttt gtgtggaaat gaagaggtag ttgcgaggac Val Cys			1548
tttgcgttta tcagtttatg tgtttgtata tctatttgat ccagttatta tggattatat			1608
acgcttgaaa ctcatTTTaa gccattgtta ttgaacgttt atcaaatact ttattat			1665
<210> 4			
<211> 494			
<212> PRT			
<213> Arabidopsis thaliana			
<400> 4			
Met Val Leu Thr 1	Lys Thr Ala Thr Asn 5 10	Asp Glu Ser Val Cys Thr Met 15	
Phe Gly Ser Arg Tyr Val Arg Thr 20 25	Leu Pro Lys Tyr Glu Ile Gly 30		
Glu Asn Ser Ile Pro Lys Asp 35 40	Ala Ala Tyr Gln Ile Ile Lys Asp Glu 45		
Leu Met Leu Asp Gly Asn Pro Arg Leu Asn Leu Ala Ser Phe Val Thr 50 55 60			
Thr Trp Met Glu Pro Glu Cys Asp Lys Leu Ile Met Asp Ser Ile Asn 65 70 75 80			
Lys Asn Tyr Val Asp Met Asp Glu Tyr Pro Val Thr Thr Glu Leu Gln 85 90 95			

Asn Arg Cys Val Asn Ile Ile Ala Arg Leu Phe Asn Ala Pro Leu Glu
 100 105 110

Glu Ser Glu Thr Ala Val Gly Val Gly Thr Val Gly Ser Ser Glu Ala
 115 120 125

Ile Met Leu Ala Gly Leu Ala Phe Lys Arg Lys Trp Gln Asn Lys Arg
 130 135 140

Lys Ala Glu Gly Lys Pro Tyr Asp Lys Pro Asn Ile Val Thr Gly Ala
 145 150 155 160

Asn Val Gln Val Cys Trp Glu Lys Phe Ala Arg Tyr Phe Glu Val Glu
 165 170 175

Leu Lys Glu Val Asn Leu Ser Glu Gly Tyr Tyr Val Met Asp Pro Asp
 180 185 190

Lys Ala Ala Glu Met Val Asp Glu Asn Thr Ile Cys Val Ala Ala Ile
 195 200 205

Leu Gly Ser Thr Leu Asn Gly Glu Phe Glu Asp Val Lys Arg Leu Asn
 210 215 220

Asp Leu Leu Val Lys Lys Asn Glu Glu Thr Gly Trp Asn Thr Pro Ile
 225 230 235 240

His Val Asp Ala Ala Ser Gly Gly Phe Ile Ala Pro Phe Ile Tyr Pro
 245 250 255

Glu Leu Glu Trp Asp Phe Arg Leu Pro Leu Val Lys Ser Ile Asn Val
 260 265 270

Ser Gly His Lys Tyr Gly Leu Val Tyr Ala Gly Ile Gly Trp Val Val
 275 280 285

Trp Arg Ala Ala Glu Asp Leu Pro Glu Glu Leu Ile Phe His Ile Asn
 290 295 300

Tyr Leu Gly Ala Asp Gln Pro Thr Phe Thr Leu Asn Phe Ser Lys Gly
 305 310 315 320

Ser Ser Gln Ile Ile Ala Gln Tyr Tyr Gln Leu Ile Arg Leu Gly Phe
 325 330 335

Glu Gly Tyr Lys Asn Val Met Glu Asn Cys Ile Glu Asn Met Val Val
 340 345 350

Leu Lys Glu Gly Ile Glu Lys Thr Glu Arg Phe Asn Ile Val Ser Lys
 355 360 365
 Asp Gln Gly Val Pro Val Val Ala Phe Ser Leu Lys Asp His Ser Phe
 370 375 380
 His Asn Glu Phe Glu Ile Ser Glu Met Leu Arg Arg Phe Gly Trp Ile
 385 390 395 400
 Val Pro Ala Tyr Thr Met Pro Ala Asp Ala Gln His Ile Thr Val Leu
 405 410 415
 Arg Val Val Ile Arg Glu Asp Phe Ser Arg Thr Leu Ala Glu Arg Leu
 420 425 430
 Val Ala Asp Ile Ser Lys Val Leu His Glu Leu Asp Thr Leu Pro Ser
 435 440 445
 Lys Ile Ser Lys Lys Met Gly Ile Glu Gly Ile Ala Glu Asn Val Lys
 450 455 460
 Glu Lys Lys Met Glu Lys Glu Ile Leu Met Glu Val Ile Val Gly Trp
 465 470 475 480
 Arg Lys Phe Val Lys Glu Arg Lys Lys Met Asn Gly Val Cys
 485 490

<210> 5

<211> 2493

<212> DNA

<213> Arabidopsis thaliana

<220>

<221> CDS

<222> (387)..(794)

<223>

<220>

<221> CDS

<222> (876)..(1088)

<223>

<220>

<221> CDS

<222> (1419)..(1673)

<223>

<220>

<221> CDS

<222> (1749)..(1799)

<223>

<220>

<221> CDS

<222> (2005)..(2490)

<223>

<220>

<221> CDS

<222> (1)..(87)

<223>

```
<400> 5
atg gtt tta tct aag aca gct tcc aaa tcc gat gat tca atc cat tca 48
Met Val Leu Ser Lys Thr Ala Ser Lys Ser Asp Asp Ser Ile His Ser
1 5 10
act ttt gct tcc cgt tat gtc cgc aac tct atc tca cgg taagaagtgg 97
Thr Phe Ala Ser Arg Tyr Val Arg Asn Ser Ile Ser Arg
20 25
aaacacaatt ttattttggt taatgttttc attggtaact agagttctaa aacttagcct 157
agacgacgat acacgacatc ttgattctag attcaatatt tattacagaa atatttattt 217
ttaatatatc atatagtctc agattttaat ttttgggtac ataagaaaga atactagatt 277
ctaacgaaat taaccacttg cactgaaaga tccgagcata atgtgtgtta ctatataaga 337
ggtattttct tttttaatct taagctaaat atatcaattt ttcacaga ttc gaa ata 395
Phe Glu Ile
30
cct aag aac tcg atc cct aag gaa gca gca tac caa atc atc aac gac 443
Page 11
```

Pro Lys Asn Ser Ile Pro Lys Glu Ala Ala Tyr Gln Ile Ile Asn Asp	
35 40 45	
gag ctc aag ttt gac ggt aac ccg agg cta aac ctg gcc tcc ttt gtg	491
Glu Leu Lys Phe Asp Gly Asn Pro Arg Leu Asn Leu Ala Ser Phe Val	
50 55 60	
acc act tgg atg gag cca gaa tgt gac aag ctc atg atg gaa tcc atc	539
Thr Thr Trp Met Glu Pro Cys Asp Lys Leu Met Met Glu Ser Ile	
65 70 75 80	
aac aag aac aac gtt gag atg gac caa tac cct gtt acc acc gac ctt	587
Asn Lys Asn Asn Val Glu Met Asp Gln Tyr Pro Val Thr Thr Asp Leu	
85 90 95	
cag aat cga tgc gtt aac atg att gcg cgt ctc ttc aac gcg cct tta	635
Gln Asn Arg Cys Val Asn Met Ile Ala Arg Leu Phe Asn Ala Pro Leu	
100 105 110	
ggt gac ggt gaa gcc gcc att ggt gtt ggc acg gtg ggg tca tgc gag	683
Gly Asp Gly Glu Ala Ala Ile Gly Val Gly Thr Val Gly Ser Ser Glu	
115 120 125	
gca gtg atg ttg gcc gga ctg gcc ttt aag aga cag tgg cag aac aag	731
Ala Val Met Leu Ala Gly Leu Ala Phe Lys Arg Gln Trp Gln Asn Lys	
130 135 140	
cgt aag gcc cta ggg ctg cct tat gat aga cct aat att gta acc gga	779
Arg Lys Ala Leu Gly Leu Pro Tyr Asp Arg Pro Asn Ile Val Thr Gly	
145 150 155 160	
gcc aat att cag gta aacaaaaa aaaattgatt aaattttaaa ccggtttagg	834
Ala Asn Ile Gln Val	
165	
tctatgttta cattgactca atttccggtt caatacaggt t tgc ttg gag aaa ttt	890
Cys Leu Glu Lys Phe	
170	
gca agg tat ttt gaa gtg gag ctt aag gaa gtg aag ctg aga gaa gga	938
Ala Arg Tyr Phe Glu Val Glu Leu Lys Glu Val Lys Leu Arg Glu Gly	
175 180 185	
tat tac gtg atg gac cct gac aaa gcg gtt gaa atg gta gac gaa aac	986
Tyr Tyr Val Met Asp Pro Asp Lys Ala Val Glu Met Val Asp Glu Asn	
190 195 200	
act ata tgc gtc gtg gcc atc ctc ggt tgc aca cta acc gga gaa ttc	1034
Thr Ile Cys Val Val Ala Ile Leu Gly Ser Thr Leu Thr Gly Glu Phe	
205 210 215	
gaa gac gtt aag ctc ctc aac gac ctt tta gtc gag aaa aac aag aaa	1082
Glu Asp Val Lys Leu Leu Asn Asp Leu Leu Val Glu Lys Asn Lys Lys	
220 225 230	
acc ggg taattgaatc aaaaccaact aacaaattaa ttttatatac ttttcctag	1138
Thr Gly	
235	
aaatattaca atttctaacy tgagatatat ttgcttagaa atatatttatt ttttgatga	1198
atataaaact tattaaccaa aacaaaacca tatatgttta cattatatgc ttccttgtat	1258
cgaatggtgt tttaaatact gattaaaaaa tgttttgctt aaaaatataa caatttataa	1318

tgtgagatat tcaagcattc taatatcaaa ccgataaaca acaacaaact gattattaat	1378
ttatttaacc ggtttggttc cggtttaata tattttaga	1433
Trp Asp Thr 240	
cac gtg gac gca cgc agt ggt ggg ttt att gct ccc ttc ttg tat ccg	1481
His Val Asp Ala Ser Gly Gly Phe Ile Ala Pro Phe Leu Tyr Pro	
245 250 255	
gac ttg gag tgg gat ttc cgg tta ccg ttg gtt aag agc ata aat gtg	1529
Asp Leu Glu Trp Asp Phe Arg Leu Pro Leu Val Lys Ser Ile Asn Val	
260 265 270	
agt ggt cac aaa tac ggt ttg gtt tac gcc ggt atc ggt tgg gtc gta	1577
Ser Gly His Lys Tyr Gly Leu Val Tyr Ala Gly Ile Gly Trp Val Val	
275 280 285	
tgg aga acc aaa acc gat ttg cct gat gaa ctt atc ttc cat atc aat	1625
Trp Arg Thr Lys Thr Asp Leu Pro Asp Glu Leu Ile Phe His Ile Asn	
290 295 300 305	
tat ctt gga gct gat caa ccc aca ttt acc ctc aac ttc tct aaa ggt	1673
Tyr Leu Gly Ala Asp Gln Pro Thr Phe Thr Leu Asn Phe Ser Lys Gly	
310 315 320	
acattaccat atcttatgta aagtttagat atatttatag attaatgttt tgttaattct	1733
tgtatattac caggg tca agt caa gtg att gct cag tac tac cag ttg att	1784
Ser Ser Gln Val Ile Ala Gln Tyr Tyr Gln Leu Ile	
325 330	
cgt ctt gga ttc gag gtaaaataa actcaataaa gaaactaaaa cgttactaaa	1839
Arg Leu Gly Phe Glu	
335	
tccaatcgta tacgtactag tataatatac aagttgttac tatactttat gactacaaaa	1899
gttcaaaacc aagaatgtac taaatacatt ccataagatt aaacgttcct aaattgacaa	1959
gttttggttt tgtagaatag ctaataatct ttttgtttgg tttag gga tat cgc aac	2016
Gly Tyr Arg Asn	
340	
gtg atg gat aat tgc cgc gag aac atg atg gta cta aga caa gga tta	2064
Val Met Asp Asn Cys Arg Glu Asn Met Met Val Leu Arg Gln Gly Leu	
345 350 355	
gag aaa acg gga cgt ttt aac atc gtc tcc aaa gaa aac ggt gtt ccg	2112
Glu Lys Thr Gly Arg Phe Asn Ile Val Ser Lys Glu Asn Gly Val Pro	
360 365 370	
tta gtg cgc ttt tct ctc aaa gat agt agc cgc cac aac gag ttc gag	2160
Leu Val Ala Phe Ser Leu Lys Asp Ser Ser Arg His Asn Glu Phe Glu	
375 380 385 390	
gtg gcc gaa atg ctt cgt cgc ttc gcc tgg atc gtt ccg gcc tac acg	2208
Val Ala Glu Met Leu Arg Arg Phe Gly Trp Ile Val Pro Ala Tyr Thr	
395 400 405	
atg cct cgc gat cgc caa cat gtc acg gtc ctt cga gtt gtt atc cga	2256
Met Pro Ala Asp Ala Gln His Val Thr Val Leu Arg Val Val Ile Arg	
410 415 420	

gaa gat ttc tct cga acc tta gct gag aga ttg gta gcc gat ttc gag Glu Asp Phe Ser Arg Thr Leu Ala Glu Arg Leu Val Ala Asp Phe Glu 425 430 435	2304
aag gtt cta cac gag ctc gat acg ctt ccc gcg agg gtt cac gcc aag Lys Val Leu His Glu Leu Asp Thr Leu Pro Ala Arg Val His Ala Lys 440 445 450	2352
atg gct agt gga aaa gtt aac ggt gtt aag aag acg cca gag gag acg Met Ala Ser Gly Lys Val Asn Gly Val Lys Lys Thr Pro Glu Glu Thr 455 460 465 470	2400
caa aga gaa gtc acg gcc tac tgg aag aag ttt gtg gac act aag act Gln Arg Glu Val Thr Ala Tyr Trp Lys Lys Phe Val Asp Thr Lys Thr 475 480 485	2448
gac aag aac ggc gtt ccg tta gta gca agt att acc aat caa tga Asp Lys Asn Gly Val Pro Leu Val Ala Ser Ile Thr Asn Gln 490 495 500	2493

<210> 6

<211> 500

<212> PRT

<213> Arabidopsis thaliana

<400> 6

Met Val Leu Ser Lys Thr Ala Ser Lys Ser Asp Asp Ser Ile His Ser
1 5 10 15

Thr Phe Ala Ser Arg Tyr Val Arg Asn Ser Ile Ser Arg Phe Glu Ile
20 25 30

Pro Lys Asn Ser Ile Pro Lys Glu Ala Ala Tyr Gln Ile Ile Asn Asp
35 40 45

Glu Leu Lys Phe Asp Gly Asn Pro Arg Leu Asn Leu Ala Ser Phe Val
50 55 60

Thr Thr Trp Met Glu Pro Glu Cys Asp Lys Leu Met Met Glu Ser Ile
65 70 75 80

Asn Lys Asn Asn Val Glu Met Asp Gln Tyr Pro Val Thr Thr Asp Leu
85 90 95

Gln Asn Arg Cys Val Asn Met Ile Ala Arg Leu Phe Asn Ala Pro Leu
100 105 110

Gly Asp Gly Glu Ala Ala Ile Gly Val Gly Thr Val Gly Ser Ser Glu
115 120 125

Ala Val Met Leu Ala Gly Leu Ala Phe Lys Arg Gln Trp Gln Asn Lys
 130 135 140
 Arg Lys Ala Leu Gly Leu Pro Tyr Asp Arg Pro Asn Ile Val Thr Gly
 145 150 155 160
 Ala Asn Ile Gln Val Cys Leu Glu Lys Phe Ala Arg Tyr Phe Glu Val
 165 170 175
 Glu Leu Lys Glu Val Lys Leu Arg Glu Gly Tyr Tyr Val Met Asp Pro
 180 185 190
 Asp Lys Ala Val Glu Met Val Asp Glu Asn Thr Ile Cys Val Val Ala
 195 200 205
 Ile Leu Gly Ser Thr Leu Thr Gly Glu Phe Glu Asp Val Lys Leu Leu
 210 215 220
 Asn Asp Leu Leu Val Glu Lys Asn Lys Lys Thr Gly Trp Asp Thr Pro
 225 230 235 240
 Ile His Val Asp Ala Ala Ser Gly Gly Phe Ile Ala Pro Phe Leu Tyr
 245 250 255
 Pro Asp Leu Glu Trp Asp Phe Arg Leu Pro Leu Val Lys Ser Ile Asn
 260 265 270
 Val Ser Gly His Lys Tyr Gly Leu Val Tyr Ala Gly Ile Gly Trp Val
 275 280 285
 Val Trp Arg Thr Lys Thr Asp Leu Pro Asp Glu Leu Ile Phe His Ile
 290 295 300
 Asn Tyr Leu Gly Ala Asp Gln Pro Thr Phe Thr Leu Asn Phe Ser Lys
 305 310 315 320
 Gly Ser Ser Gln Val Ile Ala Gln Tyr Tyr Gln Leu Ile Arg Leu Gly
 325 330 335
 Phe Glu Gly Tyr Arg Asn Val Met Asp Asn Cys Arg Glu Asn Met Met
 340 345 350
 Val Leu Arg Gln Gly Leu Glu Lys Thr Gly Arg Phe Asn Ile Val Ser
 355 360 365
 Lys Glu Asn Gly Val Pro Leu Val Ala Phe Ser Leu Lys Asp Ser Ser
 370 375 380

Arg His Asn Glu Phe Glu Val Ala Glu Met Leu Arg Arg Phe Gly Trp
 385 390 395 400
 Ile Val Pro Ala Tyr Thr Met Pro Ala Asp Ala Gln His Val Thr Val
 405 410 415
 Leu Arg Val Val Ile Arg Glu Asp Phe Ser Arg Thr Leu Ala Glu Arg
 420 425 430
 Leu Val Ala Asp Phe Glu Lys Val Leu His Glu Leu Asp Thr Leu Pro
 435 440 445
 Ala Arg Val His Ala Lys Met Ala Ser Gly Lys Val Asn Gly Val Lys
 450 455 460
 Lys Thr Pro Glu Glu Thr Gln Arg Glu Val Thr Ala Tyr Trp Lys Lys
 465 470 475 480
 Phe Val Asp Thr Lys Thr Asp Lys Asn Gly Val Pro Leu Val Ala Ser
 485 490 495
 Ile Thr Asn Gln
 500

<210> 7

<211> 2121

<212> DNA

<213> Arabidopsis thaliana

<220>

<221> CDS

<222> (1)..(87)

<223>

<220>

<221> CDS

<222> (274)..(681)

<223>

<220>

<221> CDS

<222> (782)..(994)

<223>

<220>

<221> CDS

<222> (1081)..(1335)

<223>

<220>

<221> CDS

<222> (1438)..(1488)

<223>

<220>

<221> CDS

<222> (1654)..(2118)

<223>

<400> 7
atg gtt ttg tct aag aca gtt tcc gaa tct gat gtc tca atc cat tca 48
Met Val Leu Ser Lys Thr Val Ser Glu Ser Asp Val Ser Ile His Ser
1 5 10 15
act ttt gct tct cgt tac gtc cgc aac tct ctt cca cgg taacaacttg 97
Thr Phe Ala Ser Arg Tyr Val Arg Asn Ser Leu Pro Arg
20 25
taacacaaat cttttgtcta atgttttcgt caacaatagt aacatgtaat gatgtaaacc 157
ttggatagtt ttttttttgg ccggtggttaa tgttgtagat ttattatgtg ttatatacta 217
taaggaagga catgtttcgt tattttaact taatgtatca tcatttcacg attaga ttc 276
Phe
30
gaa atg cct gag aac tca atc cca aaa gaa gca gct tac caa atc atc 324
Glu Met Pro Glu Asn Ser Ile Pro Lys Glu Ala Ala Tyr Gln Ile Ile
35 40 45
aac gac gag cta atg ctc gat ggt aac cca agg ctg aac cta gct tcc 372
Asn Asp Glu Leu Met Leu Asp Gly Asn Pro Arg Leu Asn Leu Ala Ser
50 55 60

ttc gtg acc aca tgg atg gag cca gaa tgt gac aag ctc atg atg gag Phe Val Thr Trp Met Glu Pro Glu Cys Asp Lys Leu Met Met Glu 65 70 75	420
tcc atc aac aag aac tac gtc gac atg gac gag tac cct gtc acc act Ser Ile Asn Lys Asn Tyr Val Asp Met Asp Glu Tyr Pro Val Thr Thr 80 85 90	468
gag ctt cag aac cga tgt gtt aac atg ata gca cgt ctc ttc aac gcg Glu Leu Gln Asn Arg Cys Val Asn Met Ile Ala Arg Leu Phe Asn Ala 95 100 105	516
ccg ctt ggt gac ggt gaa gct gcc gtt ggt gtt ggc acc gtc gga tcg Pro Leu Gly Asp Gly Glu Ala Ala Val Gly Val Gly Thr Val Gly Ser 115 120 125	564
tcg gag gcg att atg ttg gcc ggt ttg gct ttt aag aga caa tgg cag Ser Glu Ala Ile Met Leu Ala Gly Leu Ala Phe Lys Arg Gln Trp Gln 130 135 140	612
aat aag cgt aag gcc caa ggg ctt cct tat gat aag ccc aat atc gta Asn Lys Arg Lys Ala Gln Gly Leu Pro Tyr Asp Lys Pro Asn Ile Val 145 150 155	660
acc ggt gct aat gtc cag gta aacaaaaa aaaattgatg aaatattaac Thr Gly Ala Asn Val Gln Val 160 165	711
caagacaaaa ttgaatttat caatccggtt aagttatatg tgtgactcaa tttccggttc	771
aatacaggtt tgc tgg gag aaa ttc gca agg tat ttc gaa gtg gag ctt Cys Trp Glu Lys Phe Ala Arg Tyr Phe Glu Val Glu Leu 170 175	820
aag gaa gtg aac cta aga gaa gac tat tac gtg atg gac cct gta aag Lys Glu Val Asn Leu Arg Glu Asp Tyr Tyr Val Met Asp Pro Val Lys 180 185 190	868
gcg gtc gaa atg gta gac gaa aac aca att tgt gtc gct gcc atc ctc Ala Val Glu Met Val Asp Glu Asn Thr Ile Cys Val Ala Ala Ile Leu 195 200 205 210	916
ggt tca acg tta acc ggt gaa ttc gaa gac gtt aag ctc ctc aac gac Gly Ser Thr Leu Thr Gly Glu Phe Glu Asp Val Lys Leu Leu Asn Asp 215 220 225	964
ctc ctt gtc gag aaa aac aag caa acc ggg taattaaacc aaaccgagaa Leu Leu Val Glu Lys Asn Lys Gln Thr Gly 230 235	1014
acaagcta atcgcattgta atcggtttg agtccggtt taacgttcta aaacacaatt	1074
tgcaga tgg gac acg cca ata cac gtg gac gca gcg agt ggt ggg ttt Trp Asp Thr Pro Ile His Val Asp Ala Ala Ser Gly Gly Phe 240 245 250	1122
att gct ccg ttc ttg tat ccg gag ctg gag tgg gat ttc ccg cta ccg Ile Ala Pro Phe Leu Tyr Pro Glu Leu Glu Trp Asp Phe Arg Leu Pro 255 260 265	1170
ttg gtt aag agt att aat gtg agt ggt cac aaa tac ggt ttg gtt tac Leu Val Lys Ser Ile Asn Val Ser Gly His Lys Tyr Gly Leu Val Tyr 270 275 280	1218

gcc ggt att ggt tgg gtt gta tgg aga acc aaa acc gat ttg cct gat Ala Gly Ile Gly Trp Val Val Trp Arg Thr Lys Thr Asp Leu Pro Asp 285 290 295	1266
gaa ctt atc ttc cat atc aat tat ctt ggc gct gat caa acc ttt Glu Leu Ile Phe His Ile Asn Tyr Leu Gly Ala Asp Gln Pro Thr Phe 300 305 310	1314
aca ctc aac ttc tcc aaa ggt acattaccat aagtcataa catatataac Thr Leu Asn Phe Ser Lys Gly 315 320	1365
tttcaataat atttttgggtg tatggaattg ttttatagac taacatttg ataagtcttg	1425
tataaaccag gt tca agt caa gtg att gct cag tac tac cag ctg att cgt Ser Ser Gln Val Ile Ala Gln Tyr Tyr Gln Leu Ile Arg 325 330	1476
ctt gga ttc gag gtaataata actcaaaata gcaatatatt taccaaatgg Leu Gly Phe Glu 335	1528
tcaataaaga aactagaatg tattatatatt aagttgttac ttgttactat actttgaatt	1588
aaacgttcct aacatgacta gttttggtat tgtgtaatta ataagtgttt tcttgttga	1648
tttag ggt tat cgc aat gtg atg gat aat tgt cgg gaa aac atg atg gta Gly Tyr Arg Asn Val Met Asp Asn Cys Arg Glu Asn Met Met Val 340 345 350	1698
cta aga caa gga tta gag aaa acg gga cgt ttt aaa atc gtc tcc aaa Leu Arg Gln Gly Leu Glu Lys Thr Gly Arg Phe Lys Ile Val Ser Lys 355 360 365	1746
gaa aac ggt gtt ccg tta gtg gcg ttt tct ctc aaa gat agt agc cgc Glu Asn Gly Val Pro Leu Val Ala Phe Ser Leu Lys Asp Ser Ser Arg 370 375 380 385	1794
cac aac gag ttc gag gtg gcc cat aca ctc cgt cgc ttc ggc tgg atc His Asn Glu Phe Glu Val Ala His Thr Leu Arg Arg Phe Gly Trp Ile 390 395 400	1842
gtt ccg gcc tac acg atg cct gcg gat gcg cag cat gtc act gtc ctt Val Pro Ala Tyr Thr Met Pro Ala Asp Ala Gln His Val Thr Val Leu 405 410 415	1890
cga gtt gtt atc cga gaa gat ttc tct cga acc tta gcc gag aga ttg Arg Val Val Ile Arg Glu Asp Phe Ser Arg Thr Leu Ala Glu Arg Leu 420 425 430	1938
gta gct gat ttc gag aag gtt cta cac gag ctc gat acg ctt ccg gcg Val Ala Asp Phe Glu Lys Val Leu Leu His Glu Leu Asp Thr Leu Pro Ala 435 440 445	1986
agg gtt cac gcc aag atg gct aat gga aaa gtt aac ggt gtt aag aag Arg Val His Ala Lys Met Ala Asn Gly Lys Val Asn Gly Val Lys Lys 450 455 460 465	2034
acg cca gag gag acg cag aga gaa gtc acg gcc tac tgg aag aag ttg Thr Pro Glu Glu Thr Gln Arg Glu Val Thr Ala Tyr Trp Lys Lys Leu 470 475 480	2082
ttg gag act aag aag acc aac aag aac aca att tgc taa	2121

Leu Glu Thr Lys Lys Thr Asn Lys Asn Thr Ile Cys
 485 490

<210> 8

<211> 493

<212> PRT

<213> Arabidopsis thaliana

<400> 8

Met Val Leu Ser Lys Thr Val Ser Glu Ser Asp Val Ser Ile His Ser
 1 5 10 15

Thr Phe Ala Ser Arg Tyr Val Arg Asn Ser Leu Pro Arg Phe Glu Met
 20 25 30

Pro Glu Asn Ser Ile Pro Lys Glu Ala Ala Tyr Gln Ile Ile Asn Asp
 35 40 45

Glu Leu Met Leu Asp Gly Asn Pro Arg Leu Asn Leu Ala Ser Phe Val
 50 55 60

Thr Thr Trp Met Glu Pro Glu Cys Asp Lys Leu Met Met Glu Ser Ile
 65 70 75 80

Asn Lys Asn Tyr Val Asp Met Asp Glu Tyr Pro Val Thr Thr Glu Leu
 85 90 95

Gln Asn Arg Cys Val Asn Met Ile Ala Arg Leu Phe Asn Ala Pro Leu
 100 105 110

Gly Asp Gly Glu Ala Ala Val Gly Val Gly Thr Val Gly Ser Ser Glu
 115 120 125

Ala Ile Met Leu Ala Gly Leu Ala Phe Lys Arg Gln Trp Gln Asn Lys
 130 135 140

Arg Lys Ala Gln Gly Leu Pro Tyr Asp Lys Pro Asn Ile Val Thr Gly
 145 150 155 160

Ala Asn Val Gln Val Cys Trp Glu Lys Phe Ala Arg Tyr Phe Glu Val
 165 170 175

Glu Leu Lys Glu Val Asn Leu Arg Glu Asp Tyr Tyr Val Met Asp Pro
 180 185 190

Val Lys Ala Val Glu Met Val Asp Glu Asn Thr Ile Cys Val Ala Ala
 195 200 205
 Ile Leu Gly Ser Thr Leu Thr Gly Glu Phe Glu Asp Val Lys Leu Leu
 210 215 220
 Asn Asp Leu Leu Val Glu Lys Asn Lys Gln Thr Gly Trp Asp Thr Pro
 225 230 235 240
 Ile His Val Asp Ala Ala Ser Gly Gly Phe Ile Ala Pro Phe Leu Tyr
 245 250 255
 Pro Glu Leu Glu Trp Asp Phe Arg Leu Pro Leu Val Lys Ser Ile Asn
 260 265 270
 Val Ser Gly His Lys Tyr Gly Leu Val Tyr Ala Gly Ile Gly Trp Val
 275 280 285
 Val Trp Arg Thr Lys Thr Asp Leu Pro Asp Glu Leu Ile Phe His Ile
 290 295 300
 Asn Tyr Leu Gly Ala Asp Gln Pro Thr Phe Thr Leu Asn Phe Ser Lys
 305 310 315 320
 Gly Ser Ser Gln Val Ile Ala Gln Tyr Tyr Gln Leu Ile Arg Leu Gly
 325 330 335
 Phe Glu Gly Tyr Arg Asn Val Met Asp Asn Cys Arg Glu Asn Met Met
 340 345 350
 Val Leu Arg Gln Gly Leu Glu Lys Thr Gly Arg Phe Lys Ile Val Ser
 355 360 365
 Lys Glu Asn Gly Val Pro Leu Val Ala Phe Ser Leu Lys Asp Ser Ser
 370 375 380
 Arg His Asn Glu Phe Glu Val Ala His Thr Leu Arg Arg Phe Gly Trp
 385 390 395 400
 Ile Val Pro Ala Tyr Thr Met Pro Ala Asp Ala Gln His Val Thr Val
 405 410 415
 Leu Arg Val Val Ile Arg Glu Asp Phe Ser Arg Thr Leu Ala Glu Arg
 420 425 430
 Leu Val Ala Asp Phe Glu Lys Val Leu His Glu Leu Asp Thr Leu Pro
 435 440 445

Ala Arg Val His Ala Lys Met Ala Asn Gly Lys Val Asn Gly Val Lys
 450 455 460

Lys Thr Pro Glu Glu Thr Gln Arg Glu Val Thr Ala Tyr Trp Lys Lys
 465 470 475 480

Leu Leu Glu Thr Lys Lys Thr Asn Lys Asn Thr Ile Cys
 485 490

<210> 9

<211> 1946

<212> DNA

<213> Arabidopsis thaliana

<220>

<221> CDS

<222> (1)..(87)

<223>

<220>

<221> CDS

<222> (187)..(387)

<223>

<220>

<221> CDS

<222> (479)..(682)

<223>

<220>

<221> CDS

<222> (793)..(1260)

<223>

<220>

<221> CDS

<222> (1342)..(1392)

<223>

<220>

<221> CDS

<222> (1473)..(1943)

<223>

<400> 9
atg gta ctc gca acc aac tct gac tcc gac gag cat ttg cat tcc act 48
Met Val Leu Ala Thr Asn Ser Asp Ser Asp Glu His Leu His Ser Thr
1 5 10 15
ttt gct tct aga tat gtc cgt gct gtt gtt ccc agg ttc cagagagttt 97
Phe Ala Ser Arg Tyr Val Arg Ala Val Val Pro Arg Phe
20 25
tgctcattt tagttttttt aatcttgtat gctacattgt tatatatatta attatttatg 157
tatctgtttg catatatattga aacagggttc aag atg cct gac cat tgc atg ccc 210
Lys Met Pro Asp His Cys Met Pro
30 35
aaa gat gct gct tat caa gtg atc aat gat gag ttg atg ctt gat ggt 258
Lys Asp Ala Ala Tyr Gln Val Ile Asn Asp Glu Leu Met Leu Asp Gly
40 45 50
aat ccc agg ctt aac cta gcc tcc ttt gtc acc act tgg atg gaa cct 306
Asn Pro Arg Leu Asn Leu Ala Ser Phe Val Thr Thr Trp Met Glu Pro
55 60 65
gag tgt gac aaa ctc atc atg gat tct gtc aat aag aac tat gtt gat 354
Glu Cys Asp Lys Leu Ile Met Asp Ser Val Asn Lys Asn Tyr Val Asp
70 75 80 85
atg gat gaa tat cct gtc acc act gag ctc cag gttcctcctt ctttctcttc 407
Met Asp Glu Tyr Pro Val Thr Thr Glu Leu Gln
90 95
attctctctc tcacttactt tccactgttt tgtcatagac tcatacatct tttatctggc 467
ttatttttca g aac cgg tgt gta aat atg ata gca aac ttg ttc cat gct 517
Asn Arg Cys Val Asn Met Ile Ala Asn Leu Phe His Ala
100 105
ccc gtt gga gaa gac gag gct gct att ggg tgt gga act gtt ggt tca 565
Pro Val Gly Glu Asp Glu Ala Ala Ile Gly Cys Gly Thr Val Gly Ser
110 115 120 125
tct gag gct ata atg ctt gct ggt ttg gct ttc aaa agg aaa tgg caa 613
Ser Glu Ala Ile Met Leu Ala Gly Leu Ala Phe Lys Arg Lys Trp Gln
130 135 140
cat agg aga aaa gct cag ggt cta cct att gat aag cct aac att gtc 661
Page 23

His Arg Arg Lys Ala Gln Gly Leu Pro Ile Asp Lys Pro Asn Ile Val	
145 150 155	
act gga gcc aat gtt cag gtc taaaatatatt acttattctt atctctccaaa	712
Thr Gly Ala Asn Val Gln Val	
160	
ccatcacatt tgctttggat agtgatctgt ttctttccaa tatcaataca ttttcaaact	772
ttgtttcatc cgctcagggt tgc tgg gag aag ttt gca agg tac ttt gag gta	825
Cys Trp Glu Lys Phe Ala Arg Tyr Phe Glu Val	
165 170 175	
gag ctc aaa gag gtg aaa cta agt gaa gac tac tat gtt atg gat cca	873
Glu Leu Lys Glu Val Lys Leu Ser Glu Asp Tyr Tyr Val Met Asp Pro	
180 185 190	
gct aaa gct gta gag atg gtg gat gag aat acc atc tgt gtt gca gca	921
Ala Lys Ala Val Glu Met Val Asp Glu Asn Thr Ile Cys Val Ala Ala	
195 200 205	
att cta gga tcc aca ctt act gga gag ttt gag gac gtt aag caa ttg	969
Ile Leu Gly Ser Thr Leu Thr Gly Glu Phe Glu Asp Val Lys Gln Leu	
210 215 220	
aac gat ctc tta gct gag aaa aac gca gag aca gga tgg gaa act cct	1017
Asn Asp Leu Leu Ala Glu Lys Asn Ala Glu Thr Gly Trp Glu Thr Pro	
225 230 235	
att cat gtt gat gca gcc agt gga gga ttc att gct cct ttc ctc tac	1065
Ile His Val Asp Ala Ala Ser Gly Gly Phe Ile Ala Pro Phe Leu Tyr	
240 245 250 255	
cct gat ctt gaa tgg gac ttt agg ctt cca tgg gtg aag agt att aac	1113
Pro Asp Leu Glu Trp Asp Phe Arg Leu Pro Trp Val Lys Ser Ile Asn	
260 265 270	
gtc agt ggt cac aag tat gga ctt gtg tat gca gga gtt ggt tgg gtt	1161
Val Ser Gly His Lys Tyr Gly Leu Val Tyr Ala Gly Val Gly Trp Val	
275 280 285	
gtc tgg aga aca aaa gat gat ttg cca gag gaa ctt gtc ttc cac atc	1209
Val Trp Arg Thr Lys Asp Asp Leu Pro Glu Glu Leu Val Phe His Ile	
290 295 300	
aac tac ttg gga gct gat caa ccc act ttc act ctc aac ttc tca aaa	1257
Asn Tyr Leu Gly Ala Asp Gln Pro Thr Phe Thr Leu Asn Phe Ser Lys	
305 310 315	
ggt ttgtaaaata aaaactggct ttatccaatc aaatccatca tcacatttcc	1310
Gly	
320	
tttaagaaac tcaatgtttt cttttgcagg g tgc agc caa atc att gct cag	1362
Ser Ser Gln Ile Ile Ala Gln	
325	
tac tat cag ttt atc cga cta ggc ttt gag gtacttggtc ccttatctgc	1412
Tyr Tyr Gln Phe Ile Arg Leu Gly Phe Glu	
330 335	
attacagttt cattttttca tcttgcttaa tctaagtatt ctttttggaa actggaaaag	1472
gga tac aag aac ata atg gaa aac tgc atg gat aac gca agg agg cta	1520

Gly Tyr Lys Asn Ile Met Glu Asn Cys Met Asp Asn Ala Arg Arg Leu	
340 345 350	
aga gaa gga ata gag atg aca ggg aag ttc aac att gtg tcc aaa gat	1568
Arg Glu Gly Ile Glu Met Thr Gly Lys Phe Asn Ile Val Ser Lys Asp	
355 360 365	
att ggc gtg cca cta gtg gca ttc tct ctc aaa gac agt agc aag cac	1616
Ile Gly Val Pro Leu Val Ala Phe Ser Leu Lys Asp Ser Ser Lys His	
370 375 380 385	
acg gtg ttt gag atc gca gag tct ttg aga aaa ttc ggg tgg atc ata	1664
Thr Val Phe Glu Ile Ala Glu Ser Leu Arg Lys Phe Gly Trp Ile Ile	
390 395 400	
ccg gct tac act atg cct gca gat gca cag cac att gct gtg ctc aga	1712
Pro Ala Tyr Thr Met Pro Ala Asp Ala Gln His Ile Ala Val Leu Arg	
405 410 415	
gtt gtg ata aga gaa gac ttt agc cga ggc ctt gca gat aga ctc atc	1760
Val Val Ile Arg Glu Asp Phe Ser Arg Gly Leu Ala Asp Arg Leu Ile	
420 425 430	
aca cat atc att cag gtg ctg aaa gag att gaa ggg ctt cct agc agg	1808
Thr His Ile Ile Gln Val Leu Lys Glu Ile Glu Gly Leu Pro Ser Arg	
435 440 445	
att gca cat ctt gct gcg gct gca gcg gtt agt ggt gat gat gaa gaa	1856
Ile Ala His Leu Ala Ala Ala Ala Val Ser Gly Asp Asp Glu Glu	
450 455 460 465	
gtt aaa gtg aag act gcc aag atg tcc ttg gag gat atc act aag tat	1904
Val Lys Val Lys Thr Ala Lys Met Ser Leu Glu Asp Ile Thr Lys Tyr	
470 475 480	
tgg aaa cgc ctt gtg gaa cac aag aga aat att gtc tgc taa	1946
Trp Lys Arg Leu Val Glu His Lys Arg Asn Ile Val Cys	
485 490	
<210> 10	
<211> 494	
<212> PRT	
<213> Arabidopsis thaliana	
<400> 10	
Met Val Leu Ala Thr Asn Ser Asp Ser Asp Glu His Leu His Ser Thr	
1 5 10 15	
Phe Ala Ser Arg Tyr Val Arg Ala Val Val Pro Arg Phe Lys Met Pro	
20 25 30	
Asp His Cys Met Pro Lys Asp Ala Ala Tyr Gln Val Ile Asn Asp Glu	
35 40 45	

Leu Met Leu Asp Gly Asn Pro Arg Leu Asn Leu Ala Ser Phe Val Thr
 50 55 60
 Thr Trp Met Glu Pro Glu Cys Asp Lys Leu Ile Met Asp Ser Val Asn
 65 70 75 80
 Lys Asn Tyr Val Asp Met Asp Glu Tyr Pro Val Thr Thr Glu Leu Gln
 85 90 95
 Asn Arg Cys Val Asn Met Ile Ala Asn Leu Phe His Ala Pro Val Gly
 100 105 110
 Glu Asp Glu Ala Ala Ile Gly Cys Gly Thr Val Gly Ser Ser Glu Ala
 115 120 125
 Ile Met Leu Ala Gly Leu Ala Phe Lys Arg Lys Trp Gln His Arg Arg
 130 135 140
 Lys Ala Gln Gly Leu Pro Ile Asp Lys Pro Asn Ile Val Thr Gly Ala
 145 150 155 160
 Asn Val Gln Val Cys Trp Glu Lys Phe Ala Arg Tyr Phe Glu Val Glu
 165 170 175
 Leu Lys Glu Val Lys Leu Ser Glu Asp Tyr Tyr Val Met Asp Pro Ala
 180 185 190
 Lys Ala Val Glu Met Val Asp Glu Asn Thr Ile Cys Val Ala Ala Ile
 195 200 205
 Leu Gly Ser Thr Leu Thr Gly Glu Phe Glu Asp Val Lys Gln Leu Asn
 210 215 220
 Asp Leu Leu Ala Glu Lys Asn Ala Glu Thr Gly Trp Glu Thr Pro Ile
 225 230 235 240
 His Val Asp Ala Ala Ser Gly Gly Phe Ile Ala Pro Phe Leu Tyr Pro
 245 250 255
 Asp Leu Glu Trp Asp Phe Arg Leu Pro Trp Val Lys Ser Ile Asn Val
 260 265 270
 Ser Gly His Lys Tyr Gly Leu Val Tyr Ala Gly Val Gly Trp Val Val
 275 280 285
 Trp Arg Thr Lys Asp Asp Leu Pro Glu Glu Leu Val Phe His Ile Asn
 290 295 300

Tyr Leu Gly Ala Asp Gln Pro Thr Phe Thr Leu Asn Phe Ser Lys Gly
 305 310 315 320
 Ser Ser Gln Ile Ile Ala Gln Tyr Tyr Gln Phe Ile Arg Leu Gly Phe
 325 330 335
 Glu Gly Tyr Lys Asn Ile Met Glu Asn Cys Met Asp Asn Ala Arg Arg
 340 345 350
 Leu Arg Glu Gly Ile Glu Met Thr Gly Lys Phe Asn Ile Val Ser Lys
 355 360 365
 Asp Ile Gly Val Pro Leu Val Ala Phe Ser Leu Lys Asp Ser Ser Lys
 370 375 380
 His Thr Val Phe Glu Ile Ala Glu Ser Leu Arg Lys Phe Gly Trp Ile
 385 390 395 400
 Ile Pro Ala Tyr Thr Met Pro Ala Asp Ala Gln His Ile Ala Val Leu
 405 410 415
 Arg Val Val Ile Arg Glu Asp Phe Ser Arg Gly Leu Ala Asp Arg Leu
 420 425 430
 Ile Thr His Ile Ile Gln Val Leu Lys Glu Ile Glu Gly Leu Pro Ser
 435 440 445
 Arg Ile Ala His Leu Ala Ala Ala Ala Val Ser Gly Asp Asp Glu
 450 455 460
 Glu Val Lys Val Lys Thr Ala Lys Met Ser Leu Glu Asp Ile Thr Lys
 465 470 475 480
 Tyr Trp Lys Arg Leu Val Glu His Lys Arg Asn Ile Val Cys
 485 490

<210> 11

<211> 1705

<212> DNA

<213> Nicotiana tabacum

<220>

<221> CDS

<222> (71)..(1558)

<223>

<400> 11
 aaaatatctc cattttctcc ctgttttag tctctgatct tctccgctcg actaccacca 60
 ctacgccgcc atg gtt ctg tcc aag aca gcg tcg gaa agt gac gtc tcc 109
 Met Val Leu Ser Lys Thr Ala Ser Glu Ser Asp Val Ser
 1 5 10
 atc cac tcc act ttc gct tcc cga tat gtt cgt act tct ctt ccg agg 157
 Ile His Ser Thr Phe Ala Ser Arg Tyr Val Arg Thr Ser Leu Pro Arg
 15 20 25
 ttt aag atg cca gag aat tgc ata cca aag gaa gca tat caa atc 205
 Phe Lys Met Pro Glu Asn Ser Ile Pro Lys Glu Ala Ala Tyr Gln Ile
 30 35 40 45
 ata aat gat gag ctt atg tta gat gga aat cca aga cta aat tta gca 253
 Ile Asn Asp Glu Leu Met Leu Asp Gly Asn Pro Arg Leu Asn Leu Ala
 50 55
 tct ttt gtg aca aca tgg atg gaa cca gag tgt aac aaa ctg atg atg 301
 Ser Phe Val Thr Trp Met Glu Pro Glu Cys Asn Lys Leu Met Met
 65 70 75
 gat tcc att aac aag aat tac gtt gac atg gat gaa tac cct gta acc 349
 Asp Ser Ile Asn Lys Asn Tyr Val Asp Met Asp Glu Tyr Pro Val Thr
 80 85
 act gaa ctt cag aat cga tgt gta aac atg ata gct cat ttg ttt aac 397
 Thr Glu Leu Gln Asn Arg Cys Val Asn Met Ile Ala His Leu Phe Asn
 95 100
 gca cca ctt gga gat gga gag act gca gtt gga gtt gga act gtt gga 445
 Ala Pro Leu Gly Asp Gly Glu Thr Ala Val Gly Val Gly Thr Val Gly
 110 115 120 125
 tcc tct gag gct att atg ctt gct gga tta gct ttc aag aga aaa tgg 493
 Ser Ser Glu Ala Ile Met Leu Ala Gly Leu Ala Phe Lys Arg Lys Trp
 130 135 140
 caa aat aaa atg aaa gcc caa ggc aag ccc tgt gac aag ccc aat att 541
 Gln Asn Lys Met Lys Ala Gln Gly Lys Pro Cys Asp Lys Pro Asn Ile
 145 150 155
 gtc act ggt gcc aat gtc cag gtg tgt tgg gag aaa ttt gca agg tat 589
 Val Thr Gly Ala Asn Val Gln Val Cys Trp Glu Lys Phe Ala Arg Tyr
 160 165 170
 ttt gaa gtg gag cta aag gaa gta aag ttg agt gat gga tac tat gtg 637
 Phe Glu Val Glu Leu Lys Glu Val Lys Leu Ser Asp Gly Tyr Tyr Val
 175 180
 atg gac cct gag aaa gct gtg gaa atg gtg gat gag aac aca att tgt 685
 Met Asp Pro Glu Lys Ala Val Glu Met Val Asp Glu Asn Thr Ile Cys
 190 195 200 205
 gta gct gct atc ttg ggt tcc aca ctc aat ggt gaa ttt gaa gat gtt 733
 Val Ala Ala Ile Leu Gly Ser Thr Leu Asn Gly Glu Phe Glu Asp Val
 210 215 220
 aag cgc ttg aat gac ctc ttg att gag aag aac aaa gaa acc ggg tgg 781
 Page 28

Lys	Arg	Leu	Asn	Asp	Leu	Leu	Ile	Glu	Lys	Asn	Lys	Glu	Thr	Gly	Trp	
			225					230								
gac	act	cca	att	cat	gtg	gat	gca	gca	agt	ggg	gga	ttt	att	gca	cca	829
Asp	Thr	Pro	Ile	His	Val	Asp	Ala	Ala	Ser	Gly	Gly	Phe	Ile	Ala	Pro	
		240					245					250				
ttc	ctt	tat	cca	gag	ctt	gaa	tggt	gac	ttt	aga	ttg	cca	ttg	gtg	aag	877
Phe	Leu	Tyr	Pro	Glu	Leu	Glu	Trp	Asp	Phe	Arg	Leu	Pro	Leu	Val	Lys	
	255					260					265					
agt	ata	aac	gtg	agt	ggg	cac	aaa	tat	ggg	ctt	ggt	tat	gct	ggg	att	925
Ser	Ile	Asn	Val	Ser	Gly	His	Lys	Tyr	Gly	Leu	Val	Tyr	Ala	Gly	Ile	
	270				275					280				285		
ggg	tggt	gcc	att	tggt	agg	aat	aag	gaa	gac	tta	cct	gac	gaa	ctt	atc	973
Gly	Trp	Ala	Ile	Trp	Arg	Asn	Lys	Glu	Asp	Leu	Pro	Asp	Glu	Leu	Ile	
				290					295					300		
ttc	cac	att	aat	tat	ctt	ggg	gct	gat	caa	cct	act	ttc	act	ctc	aac	1021
Phe	His	Ile	Asn	Tyr	Leu	Gly	Ala	Asp	Gln	Pro	Thr	Phe	Thr	Leu	Asn	
			305					310					315			
ttc	tct	aaa	ggg	tct	agc	caa	gta	att	gct	caa	tat	tac	caa	ctt	att	1069
Phe	Ser	Lys	Gly	Ser	Ser	Gln	Val	Ile	Ala	Gln	Tyr	Tyr	Gln	Leu	Ile	
		320					325					330				
cgc	ttg	ggg	ttt	gag	ggg	tac	aag	aat	gtt	atg	gag	aat	tgt	caa	gaa	1117
Arg	Leu	Gly	Phe	Glu	Gly	Tyr	Lys	Asn	Val	Met	Glu	Asn	Cys	Gln	Glu	
	335					340					345					
aat	gca	agg	gta	cta	aga	gaa	gga	ctt	gaa	aaa	agt	gga	aga	ttc	aac	1165
Asn	Ala	Arg	Val	Leu	Arg	Glu	Gly	Leu	Glu	Lys	Ser	Gly	Arg	Phe	Asn	
	350				355					360				365		
ata	ata	tcc	aaa	gaa	att	gga	ggt	cca	tta	gta	gct	ttc	tct	ctt	aaa	1213
Ile	Ile	Ser	Lys	Glu	Ile	Gly	Val	Pro	Leu	Val	Ala	Phe	Ser	Leu	Lys	
				370					375					380		
gac	aac	agt	caa	cac	aat	gag	ttc	gaa	att	tct	gaa	act	ctt	aga	aga	1261
Asp	Asn	Ser	Gln	His	Asn	Glu	Phe	Glu	Ile	Ser	Glu	Thr	Leu	Arg	Arg	
			385					390					395			
ttt	gga	tggt	att	att	cct	gca	tat	act	atg	cca	cca	aat	gct	caa	cat	1309
Phe	Gly	Trp	Ile	Ile	Pro	Ala	Tyr	Thr	Met	Pro	Pro	Asn	Ala	Gln	His	
		400				405						410				
gtc	aca	gtt	ctc	aga	gtt	gtc	att	aga	gaa	gat	ttc	tcc	cgt	aca	ctc	1357
Val	Thr	Val	Leu	Arg	Val	Val	Ile	Arg	Glu	Asp	Phe	Ser	Arg	Thr	Leu	
	415					420					425					
gcc	gag	cga	ctg	gta	ata	gac	att	gaa	aaa	gtc	ctc	cac	gag	cta	gac	1405
Ala	Glu	Arg	Leu	Val	Ile	Asp	Ile	Glu	Lys	Val	Leu	His	Glu	Leu	Asp	
	430				435					440				445		
aca	ctt	ccg	gcg	agg	gtc	aac	gct	aag	cta	gcc	gtg	gcc	gag	gcg	aat	1453
Thr	Leu	Pro	Ala	Arg	Val	Asn	Ala	Lys	Leu	Ala	Val	Ala	Glu	Ala	Asn	
				450					455					460		
ggc	agc	ggc	gtg	cat	aag	aaa	aca	gat	aga	gaa	gtg	cag	ctt	gag	att	1501
Gly	Ser	Gly	Val	His	Lys	Lys	Thr	Asp	Arg	Glu	Val	Gln	Leu	Glu	Ile	
			465					470					475			
act	act	gca	tggt	aag	aaa	ttt	gtt	gct	gat	aag	aag	aag	aag	act	aac	1549

Thr Thr Ala Trp Lys Lys Phe Val Ala Asp Lys Lys Lys Lys Thr Asn
 480 485 490

gga gtt tgt taatttaatt taacaaaata tgtttataat taatatgatg 1598
 Gly Val Cys 495

atttataact actagcagtg gtactgcttg tttttatatt tgaattgttg gggtttttga 1658
 gtatgaggag ctagctattt attgctagtg aaatattggt tgaaaaa 1705

<210> 12
 <211> 496
 <212> PRT
 <213> Nicotiana tabacum

<400> 12

Met Val Leu Ser Lys Thr Ala Ser Glu Ser Asp Val Ser Ile His Ser
 1 5 10 15

Thr Phe Ala Ser Arg Tyr Val Arg Thr Ser Leu Pro Arg Phe Lys Met
 20 25 30

Pro Glu Asn Ser Ile Pro Lys Glu Ala Ala Tyr Gln Ile Ile Asn Asp
 35 40 45

Glu Leu Met Leu Asp Gly Asn Pro Arg Leu Asn Leu Ala Ser Phe Val
 50 55 60

Thr Thr Trp Met Glu Pro Glu Cys Asn Lys Leu Met Met Asp Ser Ile
 65 70 75 80

Asn Lys Asn Tyr Val Asp Met Asp Glu Tyr Pro Val Thr Thr Glu Leu
 85 90 95

Gln Asn Arg Cys Val Asn Met Ile Ala His Leu Phe Asn Ala Pro Leu
 100 105 110

Gly Asp Gly Glu Thr Ala Val Gly Val Gly Thr Val Gly Ser Ser Glu
 115 120 125

Ala Ile Met Leu Ala Gly Leu Ala Phe Lys Arg Lys Trp Gln Asn Lys
 130 135 140

Met Lys Ala Gln Gly Lys Pro Cys Asp Lys Pro Asn Ile Val Thr Gly
 145 150 155 160

Ala Asn Val Gln Val Cys Trp Glu Lys Phe Ala Arg Tyr Phe Glu Val
 165 170 175
 Glu Leu Lys Glu Val Lys Leu Ser Asp Gly Tyr Tyr Val Met Asp Pro
 180 185 190
 Glu Lys Ala Val Glu Met Val Asp Glu Asn Thr Ile Cys Val Ala Ala
 195 200 205
 Ile Leu Gly Ser Thr Leu Asn Gly Glu Phe Glu Asp Val Lys Arg Leu
 210 215 220
 Asn Asp Leu Leu Ile Glu Lys Asn Lys Glu Thr Gly Trp Asp Thr Pro
 225 230 235 240
 Ile His Val Asp Ala Ala Ser Gly Gly Phe Ile Ala Pro Phe Leu Tyr
 245 250 255
 Pro Glu Leu Glu Trp Asp Phe Arg Leu Pro Leu Val Lys Ser Ile Asn
 260 265 270
 Val Ser Gly His Lys Tyr Gly Leu Val Tyr Ala Gly Ile Gly Trp Ala
 275 280 285
 Ile Trp Arg Asn Lys Glu Asp Leu Pro Asp Glu Leu Ile Phe His Ile
 290 295 300
 Asn Tyr Leu Gly Ala Asp Gln Pro Thr Phe Thr Leu Asn Phe Ser Lys
 305 310 315 320
 Gly Ser Ser Gln Val Ile Ala Gln Tyr Tyr Gln Leu Ile Arg Leu Gly
 325 330 335
 Phe Glu Gly Tyr Lys Asn Val Met Glu Asn Cys Gln Glu Asn Ala Arg
 340 345 350
 Val Leu Arg Glu Gly Leu Glu Lys Ser Gly Arg Phe Asn Ile Ile Ser
 355 360 365
 Lys Glu Ile Gly Val Pro Leu Val Ala Phe Ser Leu Lys Asp Asn Ser
 370 375 380
 Gln His Asn Glu Phe Glu Ile Ser Glu Thr Leu Arg Arg Phe Gly Trp
 385 390 395 400
 Ile Ile Pro Ala Tyr Thr Met Pro Pro Asn Ala Gln His Val Thr Val
 405 410 415

Leu Arg Val Val Ile Arg Glu Asp Phe Ser Arg Thr Leu Ala Glu Arg
420 425 430

Leu Val Ile Asp Ile Glu Lys Val Leu His Glu Leu Asp Thr Leu Pro
435 440 445

Ala Arg Val Asn Ala Lys Leu Ala Val Ala Glu Ala Asn Gly Ser Gly
450 455 460

Val His Lys Lys Thr Asp Arg Glu Val Gln Leu Glu Ile Thr Thr Ala
465 470 475 480

Trp Lys Lys Phe Val Ala Asp Lys Lys Lys Lys Thr Asn Gly Val Cys
485 490 495

<210> 13

<211> 1771

<212> DNA

<213> Nicotiana tabacum

<220>

<221> CDS

<222> (67)..(1554)

<223>

<400> 13
tattttcatt ttctctctcg ttttaatttc tgatcttctc cgtcgtacta ccaccactac 60

gccgcc atg gtt ctg tcc aag aca gcg tcg gaa agt gac gtc tcc gtt 108
Met Val Leu Ser Lys Thr Ala Ser Glu Ser Asp Val Ser Val
1 5 10

cac tcc act ttc gcc tcc cga tat gtt cga act tct ctt ccc agg ttt 156
His Ser Thr Phe Ala Ser Arg Tyr Val Arg Thr Ser Leu Pro Arg Phe
15 20 25 30

aaa atg cca gag aat tca ata cca aag gaa gca gca tat cag att ata 204
Lys Met Pro Glu Asn Ser Ile Pro Lys Glu Ala Ala Tyr Gln Ile
35 40 45

aat gat gag ctt atg tta gat gga aat cca agg cta aat tta gca tct 252
Asn Asp Glu Leu Met Leu Asp Gly Asn Pro Arg Leu Asn Leu Ala Ser
50 55 60

ttc gtt aca aca tgg atg gag cca gaa tgt aat acg tta atg atg gat 300
Phe Val Thr Trp Met Glu Pro Glu Cys Asn Thr Leu Met Met Asp
65 70 75

tcc att aac aag aac tac gtt gac atg gat gaa tac cct gta acc act 348
Page 32

Ser	Ile	Asn	Lys	Asn	Tyr	Val	Asp	Met	Asp	Glu	Tyr	Pro	Val	Thr	Thr		
80						85					90						
gag	ctt	cag	aat	cga	tgt	gta	aat	atg	ata	gct	cat	ttg	ttt	aat	gca	396	
Glu	Leu	Gln	Asn	Arg	Cys	Val	Asn	Met	Ile	Ala	His	Leu	Phe	Asn	Ala		
95					100					105					110		
cca	ctt	gga	gat	gga	gag	act	gca	ggt	gga	ggt	gga	act	ggt	gga	tcc	444	
Pro	Leu	Gly	Asp	Gly	Glu	Thr	Ala	Val	Gly	Val	Gly	Thr	Val	Gly	Ser		
				115					120					125			
tct	gaa	gct	att	atg	ctt	gct	gga	tta	gcc	ttt	aag	aga	aaa	tggt	caa	492	
Ser	Glu	Ala	Ile	Met	Leu	Ala	Gly	Leu	Ala	Phe	Lys	Arg	Lys	Trp	Gln		
			130					135									
aat	aaa	atg	aaa	gcc	caa	ggc	aag	ccc	ttt	gat	aag	ccc	aat	att	gtc	540	
Asn	Lys	Met	Lys	Ala	Gln	Gly	Lys	Pro	Phe	Asp	Lys	Pro	Asn	Ile	Val		
			145				150					155					
acc	ggt	gct	aat	gtc	cag	gtg	tgt	tgg	gag	aaa	ttt	gca	agg	tat	ttt	588	
Thr	Gly	Ala	Asn	Val	Gln	Val	Cys	Trp	Glu	Lys	Phe	Ala	Arg	Tyr	Phe		
	160					165						170					
gaa	gtg	gag	ttg	aaa	gaa	gta	aaa	ttg	agt	gat	gga	tac	tat	gtg	atg	636	
Glu	Val	Glu	Leu	Lys	Glu	Val	Lys	Leu	Ser	Asp	Gly	Tyr	Tyr	Val	Met		
	175				180					185				190			
gac	cct	gag	aaa	gct	gtg	gaa	atg	gtg	gat	gag	aat	acc	att	tgt	gtt	684	
Asp	Pro	Glu	Lys	Ala	Val	Glu	Met	Val	Asp	Glu	Asn	Thr	Ile	Cys	Val		
				195					200					205			
gct	gct	atc	tta	ggt	tca	aca	ctc	aat	ggt	gaa	ttt	gaa	gat	gtt	aag	732	
Ala	Ala	Ile	Leu	Gly	Ser	Thr	Leu	Asn	Gly	Glu	Phe	Glu	Thr	Val	Lys		
			210					215					220				
cgt	ttg	aat	gac	ctt	ttg	att	gag	aag	aac	aaa	gaa	acc	ggg	tggt	gac	780	
Arg	Leu	Asn	Asp	Leu	Leu	Ile	Glu	Lys	Asn	Lys	Glu	Thr	Gly	Trp	Asp		
			225				230					235					
act	cca	att	cat	gtg	gat	gca	gca	agt	ggt	gga	ttt	att	gca	cca	ttc	828	
Thr	Pro	Ile	His	Val	Asp	Ala	Ala	Ser	Gly	Gly	Phe	Ile	Ala	Pro	Phe		
	240					245					250						
ctt	tat	cca	gag	ctt	gaa	tggt	gac	ttt	aga	ttg	cca	ttg	gag	aag	agt	876	
Leu	Tyr	Pro	Glu	Leu	Glu	Trp	Asp	Phe	Arg	Leu	Pro	Leu	Glu	Lys	Ser		
	255				260					265					270		
att	aat	gtg	agt	ggt	cac	aaa	tat	ggt	ctt	gtc	tat	gct	gggt	att	gggt	924	
Ile	Asn	Val	Ser	Gly	His	Lys	Tyr	Gly	Leu	Val	Tyr	Ala	Gly	Ile	Gly		
				275					280					285			
tggt	gcc	att	tggt	agg	aat	aag	gaa	gac	ttg	cct	gat	gaa	ctt	att	ttc	972	
Trp	Ala	Ile	Trp	Arg	Asn	Lys	Glu	Asp	Leu	Pro	Asp	Glu	Leu	Ile	Phe		
			290					295					300				
cac	atc	aat	tac	ctt	ggt	gct	gat	caa	cct	act	ttc	act	ctc	aac	ttc	1020	
His	Ile	Asn	Tyr	Leu	Gly	Ala	Asp	Gln	Pro	Thr	Phe	Thr	Leu	Asn	Phe		
			305				310					315					
tct	aaa	ggt	tct	agc	caa	gta	att	gct	caa	tat	tac	caa	ctt	att	cgc	1068	
Ser	Lys	Gly	Ser	Ser	Gln	Val	Ile	Ala	Gln	Tyr	Tyr	Gln	Leu	Ile	Arg		
	320					325					330						
ttg	ggt	ttt	gag	ggt	tac	aag	aat	ggt	atg	gag	aat	tgt	caa	gaa	aat	1116	
											Page						
											33						

Leu Gly Phe Glu Gly Tyr Lys Asn Val Met Glu Asn Cys Gln Glu Asn	
335 340 345 350	
gca agg gta tta aga gaa gga att gaa aaa agt gga aga ttc aac ata	1164
Ala Arg Val Leu Arg Glu Gly Ile Glu Lys Ser Gly Arg Phe Asn Ile	
355 360 365	
atc tcc aaa gaa att gga gtt ccc tta gta gca ttt tct ctt aaa gac	1212
Ile Ser Lys Glu Ile Gly Val Pro Leu Val Ala Phe Ser Leu Lys Asp	
370 375 380	
aac agt caa cac aat gag ttc gaa att tct gaa act ctt aga aga ttt	1260
Asn Ser Gln His Asn Glu Phe Glu Ile Ser Glu Thr Leu Arg Arg Phe	
385 390 395	
gga tgg att gtt ctg gca tat act atg cca cca aat gct caa cat gtc	1308
Gly Trp Ile Val Leu Ala Tyr Thr Met Pro Pro Asn Ala Gln His Val	
400 405 410	
aca gtt ctc aga gtt gtc att aga gaa gat ttc tcc cgc aca cta gcg	1356
Thr Val Leu Arg Val Val Ile Arg Glu Asp Phe Ser Arg Thr Leu Ala	
415 420 425 430	
gag cga ctg gta ata gac att gaa aaa gtc ttc cac gga gta gac aca	1404
Glu Arg Leu Val Ile Asp Ile Glu Lys Val Phe His Gly Val Asp Thr	
435 440 445	
ctt ccg gcg agg gtc aac gct aag cta gcc gtg gcc gag gcg aat ggc	1452
Leu Pro Ala Arg Val Asn Ala Lys Leu Ala Val Ala Glu Ala Asn Gly	
450 455 460	
agc ggc gtg cat aag aaa aca gat aga gaa gtg cag cta gag att act	1500
Ser Gly Val His Lys Lys Thr Asp Arg Glu Val Gln Leu Glu Ile Thr	
465 470 475	
act gca tgg ttg aaa ttt gtt gct gat aag aag aag aag act aat gga	1548
Thr Ala Trp Leu Lys Phe Val Ala Asp Lys Lys Lys Lys Thr Asn Gly	
480 485 490	
gtt tgt taatttaatt taacaaaaaa aaagtttata atatggtgat ttatgtaact	1604
Val Cys	
495	
actagcagtc gtactgcttg ttttttatat ttgagttgat gtgttttttg agcacttgag	1664
gagctagcta gttattgcta gtgaaaaatt ggatgatata ttttggacta ctttgtaagt	1724
ttgtattatt aatccaaatt aaacgatatt tatcataaaa aaaaaaa	1771

<210> 14

<211> 496

<212> PRT

<213> Nicotiana tabacum

<400> 14

Met Val Leu Ser Lys Thr Ala Ser Glu Ser Asp Val Ser Val His Ser
1 5 10 15

Thr Phe Ala Ser Arg Tyr Val Arg Thr Ser Leu Pro Arg Phe Lys Met
 20 25 30
 Pro Glu Asn Ser Ile Pro Lys Glu Ala Ala Tyr Gln Ile Ile Asn Asp
 35 40 45
 Glu Leu Met Leu Asp Gly Asn Pro Arg Leu Asn Leu Ala Ser Phe Val
 50 55 60
 Thr Thr Trp Met Glu Pro Glu Cys Asn Thr Leu Met Met Asp Ser Ile
 65 70 75 80
 Asn Lys Asn Tyr Val Asp Met Asp Glu Tyr Pro Val Thr Thr Glu Leu
 85 90 95
 Gln Asn Arg Cys Val Asn Met Ile Ala His Leu Phe Asn Ala Pro Leu
 100 105 110
 Gly Asp Gly Glu Thr Ala Val Gly Val Gly Thr Val Gly Ser Ser Glu
 115 120 125
 Ala Ile Met Leu Ala Gly Leu Ala Phe Lys Arg Lys Trp Gln Asn Lys
 130 135 140
 Met Lys Ala Gln Gly Lys Pro Phe Asp Lys Asn Ile Val Thr Gly
 145 150 155 160
 Ala Asn Val Gln Val Cys Trp Glu Lys Phe Ala Arg Tyr Phe Glu Val
 165 170 175
 Glu Leu Lys Glu Val Lys Leu Ser Asp Gly Tyr Tyr Val Met Asp Pro
 180 185 190
 Glu Lys Ala Val Glu Met Val Asp Glu Asn Thr Ile Cys Val Ala Ala
 195 200 205
 Ile Leu Gly Ser Thr Leu Asn Gly Glu Phe Glu Asp Val Lys Arg Leu
 210 215 220
 Asn Asp Leu Leu Ile Glu Lys Asn Lys Glu Thr Gly Trp Asp Thr Pro
 225 230 235 240
 Ile His Val Asp Ala Ala Ser Gly Gly Phe Ile Ala Pro Phe Leu Tyr
 245 250 255
 Pro Glu Leu Glu Trp Asp Phe Arg Leu Pro Leu Glu Lys Ser Ile Asn
 260 265 270

Val Ser Gly His Lys Tyr Gly Leu Val Tyr Ala Gly Ile Gly Trp Ala
 275 280 285
 Ile Trp Arg Asn Lys Glu Asp Leu Pro Asp Glu Leu Ile Phe His Ile
 290 295 300
 Asn Tyr Leu Gly Ala Asp Gln Pro Thr Phe Thr Leu Asn Phe Ser Lys
 305 310 315 320
 Gly Ser Ser Gln Val Ile Ala Gln Tyr Tyr Gln Leu Ile Arg Leu Gly
 325 330 335
 Phe Glu Gly Tyr Lys Asn Val Met Glu Asn Cys Gln Glu Asn Ala Arg
 340 345 350
 Val Leu Arg Glu Gly Ile Glu Lys Ser Gly Arg Phe Asn Ile Ile Ser
 355 360 365
 Lys Glu Ile Gly Val Pro Leu Val Ala Phe Ser Leu Lys Asp Asn Ser
 370 375 380
 Gln His Asn Glu Phe Glu Ile Ser Glu Thr Leu Arg Arg Phe Gly Trp
 385 390 395 400
 Ile Val Leu Ala Tyr Thr Met Pro Pro Asn Ala Gln His Val Thr Val
 405 410 415
 Leu Arg Val Val Ile Arg Glu Asp Phe Ser Arg Thr Leu Ala Glu Arg
 420 425 430
 Leu Val Ile Asp Ile Glu Lys Val Phe His Gly Val Asp Thr Leu Pro
 435 440 445
 Ala Arg Val Asn Ala Lys Leu Ala Val Ala Glu Ala Asn Gly Ser Gly
 450 455 460
 Val His Lys Lys Thr Asp Arg Glu Val Gln Leu Glu Ile Thr Thr Ala
 465 470 475 480
 Trp Leu Lys Phe Val Ala Asp Lys Lys Lys Lys Thr Asn Gly Val Cys
 485 490 495

<210> 15

<211> 1785

<212> DNA

<213> Petunia x hybrida

<220>

<221> CDS

<222> (72)..(1571)

<223>

<400> 15
aaagagtaca aactaatatc cacttaaatt gtatttctcc attttctctc tttatttagt 60
ctgtcataac a atg gtt cta tca aag aca gtg tcg cag agc gat gtg tcc 110
Met Val Leu Ser Lys Thr Val Ser Gln Ser Asp Val Ser
1 5 10
att cac tcc acg ttt gct tct cga tat gtt cga act tct ccc agg 158
Ile His Ser Thr Phe Ala Ser Arg Tyr Val Arg Thr Ser Leu Pro Arg
15 20 25
ttt aaa atg cca gat aat tcg ata cca aaa gaa gca gca tat cag atc 206
Phe Lys Met Pro Asp Asn Ser Ile Pro Lys Glu Ala Ala Tyr Gln Ile
30 35 40 45
ata aat gat gaa ctg atg tta gat gga aac cca agg ctg aac ttg gct 254
Ile Asn Asp Glu Leu Met Leu Asp Gly Asn Pro Arg Leu Asn Leu Ala
50 55 60
tct ttt gtt aca aca tgg atg gaa cca gag tgt gat aag ttg atg atg 302
Ser Phe Val Thr Trp Met Glu Pro Glu Cys Asp Lys Leu Met Met
65 70 75
gac tct att aac aag aac tat gtt gat atg gat gaa tat cct gtt acc 350
Asp Ser Ile Asn Lys Asn Tyr Val Asp Met Asp Glu Tyr Pro Val Thr
80 85 90
act gag ctt cag aat cga tgt gta aac atg ata gct cat ttg ttt aat 398
Thr Glu Leu Gln Asn Arg Cys Val Asn Met Ile Ala His Leu Phe Asn
95 100 105
gca cca ctt gaa gat gga gaa act gca gtt gga gtt gga act gtt gga 446
Ala Pro Leu Glu Asp Gly Glu Thr Ala Val Gly Val Gly Thr Val Gly
110 115 120 125
tcc tct gaa gcc att atg ctt gct gga tta gct ttc aag aga aaa tgg 494
Ser Ser Glu Ala Met Leu Ala Gly Leu Ala Phe Lys Arg Lys Trp
130 135 140
cag aac aaa atg aaa gcc caa ggc aaa ccc tgt gac aag ccc aac att 542
Gln Asn Lys Met Lys Ala Gln Gly Lys Pro Cys Asp Lys Pro Asn Ile
145 150 155
gtt act ggt gca aat gtc cag gtg tgc tgg gag aaa ttt gca agg tat 590
Val Thr Gly Ala Asn Val Gln Val Cys Trp Glu Lys Phe Ala Arg Tyr
160 165 170
ttt gaa gtg gag cta aag gaa gta aag ctt agt gaa gga tac tat gtg 638
Phe Glu Val Glu Leu Lys Glu Val Lys Leu Ser Glu Gly Tyr Tyr Val
175 180 185

atg gac cct gag aaa gct gtg gag atg gtg gat gaa aac acc att tgt Met Asp Pro Glu Lys Ala Val Glu Met Val Asp Glu Asn Thr Ile Cys 190 195 200 205	686
gta gct gct atc tta ggt tcc acc ctc aat gga gaa ttt gaa gac gtt Val Ala Ala Ile Leu Gly Ser Thr Leu Asn Gly Glu Phe Glu Asp Val 210 215 220	734
aag cgc ttg aat gat ctc ttg gtc gag aag aac aaa gaa acc ggg tgg Lys Arg Leu Asn Asp Leu Leu Val Glu Lys Asn Lys Glu Thr Gly Trp 225 230 235	782
gac act cca att cat gtg gat gca agt ggt gga ttt att gca ccg Asp Thr Pro Ile His Val Asp Ala Ala Ser Gly Gly Phe Ile Ala Pro 240 245 250	830
ttc att tac cca gag ctt gag tgg gac ttt aga ttg cca tta gtg aag Phe Ile Tyr Pro Glu Leu Glu Trp Asp Phe Arg Leu Pro Leu Val Lys 255 260	878
agc att aat gta agt ggt cac aaa tat ggt ctt gtc tat gct ggt att Ser Ile Asn Val Ser Gly His Lys Tyr Gly Leu Val Tyr Ala Gly Ile 270 275 280 285	926
ggt tgg gtc gtt tgg agg aac aag gat gat ttg cct gat gaa ctt atc Gly Trp Val Val Trp Arg Asn Lys Asp Asp Leu Pro Asp Glu Leu Ile 290 295 300	974
ttc cac att aat tat ctt ggt gct gat caa cct act ttc act ctc aac Phe His Ile Asn Tyr Leu Gly Ala Asp Gln Pro Thr Phe Thr Leu Asn 305 310 315	1022
ttt tct aaa ggt tct agc caa gta att gct caa tat tac cca ctt att Phe Ser Lys Gly Ser Ser Gln Val Ile Ala Gln Tyr Tyr Gln Leu Ile 320 325 330	1070
cgc ttg ggt tat gag ggt tac aag aat gtg atg gag aat tgt caa gaa Arg Leu Gly Tyr Glu Gly Tyr Lys Asn Val Met Glu Asn Cys Gln Glu 335 340 345	1118
aat gca tcg gta cta aga gaa ggg cta gaa aag aca gga aga ttc aac Asn Ala Ser Val Leu Arg Glu Gly Leu Glu Lys Thr Gly Arg Phe Asn 350 355 360 365	1166
ata atc tcc aaa gaa att gga gta cct tta gta gca ttc tct ctt aaa Ile Ile Ser Lys Glu Ile Gly Val Pro Leu Val Ala Phe Ser Leu Lys 370 375 380	1214
gac aac agg caa cac aac gag ttc gag att tct gaa act tta agg aga Asp Asn Arg Gln His Asn Glu Phe Glu Ile Ser Glu Thr Leu Arg Arg 385 390 395	1262
ttt ggt tgg att gtt cct gca tat act atg cca cca aac gca caa cac Phe Gly Trp Ile Val Pro Ala Tyr Thr Met Pro Pro Asn Ala Gln His 400 405 410 415	1310
att aca gtt ctc aga gtt gtg atc aga gaa gat ttc tcc cgt acg ctt Ile Thr Val Leu Arg Val Val Ile Arg Glu Asp Phe Ser Arg Thr Leu 420 425 430 435	1358
gca gaa cga ctg gta aga gac atc gaa aaa gtc ctt cat gaa ctt gac Ala Glu Arg Leu Val Arg Asp Ile Glu Lys Val Leu His Glu Leu Asp 430 435 440 445	1406

aca ctc cct gca cgt gtc aat gct aag ctc gct gtg gcc gag gag cag 1454
 Thr Leu Pro Ala Arg Val Asn Ala Lys Leu Ala Val Ala Glu Glu Gln
 450 455 460

gcg gct gcg aat ggc agc gag gtg cat aag aaa aca gat agc gaa gtg 1502
 Ala Ala Ala Asn Gly Ser Glu Val His Lys Lys Thr Asp Ser Glu Val
 465 470 475

cag ttg gag atg ata act gca tgg aag aag ttt gtt gaa gaa aag aag 1550
 Gln Leu Glu Met Ile Thr Ala Trp Lys Lys Phe Val Glu Glu Lys Lys
 480 485 490

aag aag act aat cga gtt tgt taattaatta tattagtgtt tataatatga 1601
 Lys Lys Thr Asn Arg Val Cys
 495 500

tgaatatggc tattatcatt ggtgactgct tgtagtata ttagctgtga ttatcaccaa 1661

tatgagtttg gttttctga ttggttctt ttcagtactt gaaaagttgt tattgatatt 1721

gtaaaattgt actttttaac tatttggatt attaatgcca attttctagt gtacttaata 1781

aaaa 1785

<210> 16

<211> 500

<212> PRT

<213> Petunia x hybrida

<400> 16

Met Val Leu Ser Lys Thr Val Ser Gln Ser Asp Val Ser Ile His Ser
 1 5 10 15

Thr Phe Ala Ser Arg Tyr Val Arg Thr Ser Leu Pro Arg Phe Lys Met
 20 25 30

Pro Asp Asn Ser Ile Pro Lys Glu Ala Ala Tyr Gln Ile Ile Asn Asp
 35 40 45

Glu Leu Met Leu Asp Gly Asn Pro Arg Leu Asn Leu Ala Ser Phe Val
 50 55 60

Thr Thr Trp Met Glu Pro Glu Cys Asp Lys Leu Met Met Asp Ser Ile
 65 70 75 80

Asn Lys Asn Tyr Val Asp Met Asp Glu Tyr Pro Val Thr Thr Glu Leu
 85 90 95

Gln Asn Arg Cys Val Asn Met Ile Ala His Leu Phe Asn Ala Pro Leu
 100 105 110

Glu Asp Gly Glu Thr Ala Val Gly Val Gly Thr Val Gly Ser Ser Glu
 115 120 125
 Ala Ile Met Leu Ala Gly Leu Ala Phe Lys Arg Lys Trp Gln Asn Lys
 130 135 140
 Met Lys Ala Gln Gly Lys Pro Cys Asp Lys Pro Asn Ile Val Thr Gly
 145 150 155 160
 Ala Asn Val Gln Val Cys Trp Glu Lys Phe Ala Arg Tyr Phe Glu Val
 165 170 175
 Glu Leu Lys Glu Val Lys Leu Ser Glu Gly Tyr Tyr Val Met Asp Pro
 180 185 190
 Glu Lys Ala Val Glu Met Val Asp Glu Asn Thr Ile Cys Val Ala Ala
 195 200 205
 Ile Leu Gly Ser Thr Leu Asn Gly Glu Phe Glu Asp Val Lys Arg Leu
 210 215 220
 Asn Asp Leu Leu Val Glu Lys Asn Lys Glu Thr Gly Trp Asp Thr Pro
 225 230 235 240
 Ile His Val Asp Ala Ala Ser Gly Gly Phe Ile Ala Pro Phe Ile Tyr
 245 250 255
 Pro Glu Leu Glu Trp Asp Phe Arg Leu Pro Leu Val Lys Ser Ile Asn
 260 265 270
 Val Ser Gly His Lys Tyr Gly Leu Val Tyr Ala Gly Ile Gly Trp Val
 275 280 285
 Val Trp Arg Asn Lys Asp Asp Leu Pro Asp Glu Leu Ile Phe His Ile
 290 295 300
 Asn Tyr Leu Gly Ala Asp Gln Pro Thr Phe Thr Leu Asn Phe Ser Lys
 305 310 315 320
 Gly Ser Ser Gln Val Ile Ala Gln Tyr Tyr Gln Leu Ile Arg Leu Gly
 325 330 335
 Tyr Glu Gly Tyr Lys Asn Val Met Glu Asn Cys Gln Glu Asn Ala Ser
 340 345 350
 Val Leu Arg Glu Gly Leu Glu Lys Thr Gly Arg Phe Asn Ile Ile Ser
 355 360 365

Lys Glu Ile Gly Val Pro Leu Val Ala Phe Ser Leu Lys Asp Asn Arg
 370 375 380

Gln His Asn Glu Phe Glu Ile Ser Glu Thr Leu Arg Arg Phe Gly Trp
 385 390 395 400

Ile Val Pro Ala Tyr Thr Met Pro Pro Asn Ala Gln His Ile Thr Val
 405 410 415

Leu Arg Val Val Ile Arg Glu Asp Phe Ser Arg Thr Leu Ala Glu Arg
 420 425 430

Leu Val Arg Asp Ile Glu Lys Val Leu His Glu Leu Asp Thr Leu Pro
 435 440 445

Ala Arg Val Asn Ala Lys Leu Ala Val Ala Glu Glu Gln Ala Ala Ala
 450 455 460

Asn Gly Ser Glu Val His Lys Lys Thr Asp Ser Glu Val Gln Leu Glu
 465 470 475 480

Met Ile Thr Ala Trp Lys Lys Phe Val Glu Glu Lys Lys Lys Lys Thr
 485 490 495

Asn Arg Val Cys
 500

<210> 17

<211> 1783

<212> DNA

<213> Lycopersicon esculentum

<220>

<221> CDS

<222> (6)..(1511)

<223>

<400> 17
 aaaaa atg gtg tta aca acg acg tcg ata aga gat tca gaa gag agc ttg 50
 Met Val Leu Thr Thr Ser Ile Arg Asp Ser Glu Glu Ser Leu 15
 1 5 10

cac tgt aca ttt gca tca aga tat gta cag gaa cct tta cct aag ttc 98
 Page 41

His	Cys	Thr	Phe	Ala	Ser	Arg	Tyr	Val	Gln	Glu	Pro	Leu	Pro	Lys	Phe	
			20						25					30		
aaa	atg	cct	aaa	aaa	tcc	atg	ccg	aaa	gaa	gca	gct	tat	cag	att	gta	146
Lys	Met	Pro	Lys	Lys	Ser	Met	Pro	Lys	Glu	Ala	Ala	Tyr	Gln	Ile	Val	
		35						40					45			
aac	gac	gag	ctt	atg	tgt	gat	ggg	aac	ccc	agg	tgt	aat	tta	gct	tcc	194
Asn	Asp	Glu	Leu	Met	Leu	Asp	Gly	Asn	Pro	Arg	Leu	Asn	Leu	Ala	Ser	
		50					55					60				
ttt	gtt	agc	aca	tgg	atg	gag	ccc	gag	tgc	gat	aag	ctc	atc	atg	tca	242
Phe	Val	Ser	Thr	Trp	Met	Glu	Pro	Glu	Cys	Asp	Lys	Leu	Ile	Met	Ser	
	65				70						75					
tcc	att	aat	aaa	aac	tat	gtc	gac	atg	gat	gag	tat	cct	gtc	acc	act	290
Ser	Ile	Asn	Lys	Asn	Tyr	Val	Asp	Met	Asp	Glu	Tyr	Pro	Val	Thr	Thr	
	80				85					90					95	
gaa	ctt	caa	aat	aga	tgt	gtt	aac	atg	tta	gca	cat	ctt	ttc	cat	gcc	338
Glu	Leu	Gln	Asn	Arg	Cys	Val	Asn	Met	Leu	Ala	His	Leu	Phe	His	Ala	
				100					105					110		
ccg	gtt	ggt	gat	gat	gag	act	gca	gtt	gga	gtt	ggt	aca	gtg	ggt	tca	386
Pro	Val	Gly	Asp	Asp	Glu	Thr	Ala	Val	Gly	Val	Gly	Thr	Val	Gly	Ser	
		115						120					125			
tca	gag	gca	ata	atg	ctt	gct	ggc	ctt	gct	ttc	aaa	cgc	aaa	tgg	caa	434
Ser	Glu	Ala	Ile	Met	Leu	Ala	Gly	Leu	Ala	Phe	Lys	Arg	Lys	Trp	Gln	
		130					135					140				
tcg	aaa	aga	aaa	gca	gaa	ggc	aaa	cct	ttc	gat	aag	cct	aat	ata	gtc	482
Ser	Lys	Arg	Lys	Ala	Glu	Gly	Lys	Pro	Phe	Asp	Lys	Pro	Asn	Ile	Val	
	145					150					155					
act	gga	gct	aat	gtg	cag	gtc	tgc	tgg	gaa	aaa	ttt	gca	agg	tat	ttt	530
Thr	Gly	Ala	Asn	Val	Gln	Val	Cys	Trp	Glu	Lys	Phe	Ala	Arg	Tyr	Phe	
	160				165					170					175	
gag	gtt	gag	tgt	aag	gag	gtg	aaa	cta	aaa	gaa	gga	tac	tat	gta	atg	578
Glu	Val	Glu	Leu	Lys	Glu	Val	Lys	Leu	Lys	Glu	Gly	Tyr	Tyr	Val	Met	
				180					185					190		
gac	cct	gcc	aaa	gca	gta	gag	ata	gtg	gat	gag	aat	aca	ata	tgt	gtt	626
Asp	Pro	Ala	Lys	Ala	Val	Glu	Ile	Val	Asp	Glu	Asn	Thr	Ile	Cys	Val	
			195					200					205			
gct	gca	atc	ctt	ggg	tct	act	ctg	act	ggg	gag	ttt	gag	gat	gtg	aag	674
Ala	Ala	Ile	Leu	Gly	Ser	Thr	Leu	Thr	Gly	Glu	Phe	Glu	Asp	Val	Lys	
		210					215					220				
ctc	cta	aac	gag	ctc	ctt	aca	aaa	aag	aac	aag	gaa	acc	gga	tgg	gag	722
Leu	Leu	Asn	Glu	Leu	Leu	Thr	Lys	Lys	Asn	Lys	Glu	Thr	Gly	Trp	Glu	
		225				230					235					
aca	ccg	att	cat	gtc	gat	gct	gcg	agt	gga	gga	ttt	att	gct	cct	ttc	770
Thr	Pro	Ile	His	Val	Asp	Ala	Ala	Ser	Gly	Gly	Phe	Ile	Ala	Pro	Phe	
		240			245					250					255	
ctc	tgg	cca	gat	ctt	gaa	tgg	gat	ttc	cgt	ttg	cct	ctt	gtg	aaa	agt	818
Leu	Trp	Pro	Asp	Leu	Glu	Trp	Asp	Phe	Arg	Leu	Pro	Leu	Val	Lys	Ser	
				260					265					270		
ata	aat	gtc	agc	ggg	cac	aag	tat	ggc	ctt	gta	tat	gct	ggg	gtc	ggg	866

Ile Asn Val	Ser Gly His Lys Tyr Gly	Leu Val Tyr Ala Gly Val Gly	
275	280	285	
tgg gtg ata	tgg cgg agc aag gaa gac	ttg ccc gat gaa ctc gtc ttt	914
Trp Val Ile	Trp Arg Ser Lys Glu Asp	Leu Pro Asp Glu Leu Val Phe	
290	295	300	
cat ata aac tac ctt	ggg tct gat cag cct act ttt act ctc aac ttc		962
His Ile Asn Tyr Leu Gly	Ser Asp Gln Pro Thr Phe Thr	Leu Asn Phe	
305	310	315	
tct aaa ggt tcc tat	caa ata att gca cag tat tat cag tta ata aga		1010
Ser Lys Gly Ser Tyr	Gln Ile Ile Ala Gln Tyr Tyr Gln Leu Ile Arg		
320	325	330	335
ctt ggc ttt gag ggt	tat aag aac gtc atg aag aat tgc tta tca aac		1058
Leu Gly Phe Glu	Tyr Lys Asn Val Met Lys Asn Cys Leu Ser Asn		
340	345	350	
gca aaa gta cta aca	gag gga atc aca aaa atg ggg cgg ttc gat att		1106
Ala Lys Val Leu Thr	Glu Gly Ile Thr Lys Met Gly Arg Phe Asp Ile		
355	360	365	
gtc tct aag gat	gtg ggt gtt cct gtt gta gca ttt tct ctc agg gac		1154
Val Ser Lys Asp Val	Gly Val Pro Val Val Ala Phe Ser	Leu Arg Asp	
370	375	380	
agc agc aaa tat acg	gta ttt gaa gta tct gag cat ctc aga aga ttt		1202
Ser Ser Lys Tyr Thr Val	Phe Glu Val Ser Glu His Leu Arg Arg Phe		
385	390	395	
gga tgg atc gtc cct	gca tac aca atg cca ccg gat gct gaa cac att		1250
Gly Trp Ile Val Pro	Ala Tyr Thr Met Pro Asp Ala Glu His Ile		
400	405	410	415
gct gta ctg cgg gtt	gtc att aga gag gat ttc agc cac agc cta gct		1298
Ala Val Leu Arg Val	Val Ile Arg Glu Asp Phe Ser His Ser Leu Ala		
420	425	430	
gag aga ctt gtt tct	gac att gag aaa att ctg tca gag ttg gac aca		1346
Glu Arg Leu Val Ser	Asp Ile Glu Lys Ile Leu Ser Glu Leu Asp Thr		
435	440	445	
cag cct cct cgt ttg	ccc acc aaa gct gtc cgt gtc act gct gag gaa		1394
Gln Pro Pro Arg Leu	Pro Thr Lys Ala Val Arg Val Thr Ala Glu Glu		
450	455	460	
gtg cgt gat gac aag	ggt gat ggg ctt cat cat ttt cac atg gat act		1442
Val Arg Asp Asp Lys	Gly Asp Gly Leu His His Phe His Met Asp Thr		
465	470	475	
gta gag act cag aaa	gac att atc aaa cat tgg agg aaa atc gca ggg		1490
Val Glu Thr Gln Lys	Asp Ile Ile Lys His Trp Arg Lys Ile Ala Gly		
480	485	490	495
aag aag acc agc gga	gtc tgc taggtctggc cacacttggt atctgggctc		1541
Lys Lys Thr Ser Gly	Val Cys		
500			
cgctccatc gccatcctgt	agtatgtatt acgtgtgttg ttccatctt atgtagtagt		1601
tggtactgta atctgtgttaa	atgctttcat gatcttggct ctgtatatgc taaataagca		1661
ctgcatttca agttctctgga	agtattttatg tatgaatcaa tccgggcata attggtagaa		1721

tgccctctct gcgtcatctt tgaatttcac gtgcaataat atttgaaatc tacacctatt 1781
at 1783

<210> 18

<211> 502

<212> PRT

<213> Lycopersicon esculentum

<400> 18

Met Val Leu Thr Thr Thr Ser Ile Arg Asp Ser Glu Glu Ser Leu His
1 5 10 15

Cys Thr Phe Ala Ser Arg Tyr Val Gln Glu Pro Leu Pro Lys Phe Lys
20 25 30

Met Pro Lys Lys Ser Met Pro Lys Glu Ala Ala Tyr Gln Ile Val Asn
35 40 45

Asp Glu Leu Met Leu Asp Gly Asn Pro Arg Leu Asn Leu Ala Ser Phe
50 55 60

Val Ser Thr Trp Met Glu Pro Glu Cys Asp Lys Leu Ile Met Ser Ser
65 70 75 80

Ile Asn Lys Asn Tyr Val Asp Met Asp Glu Tyr Pro Val Thr Thr Glu
85 90 95

Leu Gln Asn Arg Cys Val Asn Met Leu Ala His Leu Phe His Ala Pro
100 105 110

Val Gly Asp Asp Glu Thr Ala Val Gly Val Gly Thr Val Gly Ser Ser
115 120 125

Glu Ala Ile Met Leu Ala Gly Leu Ala Phe Lys Arg Lys Trp Gln Ser
130 135 140

Lys Arg Lys Ala Glu Gly Lys Pro Phe Asp Lys Pro Asn Ile Val Thr
145 150 155 160

Gly Ala Asn Val Gln Val Cys Trp Glu Lys Phe Ala Arg Tyr Phe Glu
165 170 175

Val Glu Leu Lys Glu Val Lys Leu Lys Glu Gly Tyr Tyr Val Met Asp
180 185 190

Pro Ala Lys Ala Val Glu Ile Val Asp Glu Asn Thr Ile Cys Val Ala
 195 200 205
 Ala Ile Leu Gly Ser Thr Leu Thr Gly Glu Phe Glu Asp Val Lys Leu
 210 215 220
 Leu Asn Glu Leu Leu Thr Lys Lys Asn Lys Glu Thr Gly Trp Glu Thr
 225 230 235 240
 Pro Ile His Val Asp Ala Ala Ser Gly Gly Phe Ile Ala Pro Phe Leu
 245 250 255
 Trp Pro Asp Leu Glu Trp Asp Phe Arg Leu Pro Leu Val Lys Ser Ile
 260 265 270
 Asn Val Ser Gly His Lys Tyr Gly Leu Val Tyr Ala Gly Val Gly Trp
 275 280 285
 Val Ile Trp Arg Ser Lys Glu Asp Leu Pro Asp Glu Leu Val Phe His
 290 295 300
 Ile Asn Tyr Leu Gly Ser Asp Gln Pro Thr Phe Thr Leu Asn Phe Ser
 305 310 315 320
 Lys Gly Ser Tyr Gln Ile Ile Ala Gln Tyr Tyr Gln Leu Ile Arg Leu
 325 330 335
 Gly Phe Glu Gly Tyr Lys Asn Val Met Lys Asn Cys Leu Ser Asn Ala
 340 345 350
 Lys Val Leu Thr Glu Gly Ile Thr Lys Met Gly Arg Phe Asp Ile Val
 355 360 365
 Ser Lys Asp Val Gly Val Pro Val Val Ala Phe Ser Leu Arg Asp Ser
 370 375 380
 Ser Lys Tyr Thr Val Phe Glu Val Ser Glu His Leu Arg Arg Phe Gly
 385 390 395 400
 Trp Ile Val Pro Ala Tyr Thr Met Pro Pro Asp Ala Glu His Ile Ala
 405 410 415
 Val Leu Arg Val Val Ile Arg Glu Asp Phe Ser His Ser Leu Ala Glu
 420 425 430
 Arg Leu Val Ser Asp Ile Glu Lys Ile Leu Ser Glu Leu Asp Thr Gln
 435 440 445

Pro Pro Arg Leu Pro Thr Lys Ala Val Arg Val Thr Ala Glu Glu Val
 450 455 460

Arg Asp Asp Lys Gly Asp Gly Leu His His Phe His Met Asp Thr Val
 465 470 475 480

Glu Thr Gln Lys Asp Ile Ile Lys His Trp Arg Lys Ile Ala Gly Lys
 485 490 495

Lys Thr Ser Gly Val Cys
 500

<210> 19

<211> 33

<212> DNA

<213> Artificial Sequence

<220>

<223> Synthetic oligonucleotide primer

<400> 19
 gccctctaga atggtgctct cccacgcgt atc

33

<210> 20

<211> 32

<212> DNA

<213> Artificial Sequence

<220>

<223> Synthetic oligonucleotide primer

<400> 20
 gccctctaga ttagcagata ccactcgtct tc

32

<210> 21

<211> 32

<212> DNA

<213> Artificial Sequence

<220>
 <223> Synthetic oligonucleotide primer
 <400> 21
 gccctctaga ttagctcttc ttcaccgtga cc 32
 <210> 22
 <211> 32
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Synthetic oligonucleotide primer
 <400> 22
 gccctctaga atggttttga caaaaaccgc aa 32
 <210> 23
 <211> 34
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Synthetic oligonucleotide primer
 <400> 23
 gccctctaga ttagcacaca ccattcatct tctt 34
 <210> 24
 <211> 32
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Synthetic oligonucleotide primer
 <400> 24
 gccctctaga ttacatcttc ttctccttta ca 32